RAILROAD GAZETTE

FRIDAY, APRIL 29, 1904.

CONTENTS

ILLUSTRATED:
Unique Passenger Station on the Northern Pacific.. 316
Masonry for the Blackwell's Island Bridge..... 319
Pacific Type (4-6-2) Locomotive—Michigan Central. 320
The Tate Flexible Stay-Bolt..... 323
Electric Auto Car—North Eastern Railway..... 324
Stuyvesant Fish..... 328
The Columbus Pumping Engine..... 329
The Cleveland Pressed-Steel Carline..... 329
St. Louis Exhibit of the Pressed Steel Car Co..... 330
A New Stump Pulling Machine..... 330
The Harris Combined Train Signal and Indicator.. 331
CONTRIBUTIONS:
English and American High-Speed Trains..... 315
The Tensile Strength of Concrete..... 315
Damage Suits in Texas..... 315
EDITORIAL:
A Record-Breaking Death List..... 326
An Aftermath of the Merger Decision..... 326
Railroad Borrowing on Short-Term Notes..... 327
Railroad Automobiles and Electrification..... 327
March Accidents..... 328
Editorial Notes..... 326, 328
New Publications..... 328
Trade Catalogues..... 328
MISCELLANEOUS:
Mr. Priestley's Report on American Railroads.... 315
The Upbuilding of a Railroad System..... 317
Mr. Parsons on Conditions at Panama..... 319
Turbine Express Steamers for the Cunard Line... 320
Accident Bulletin No. 10..... 322
The Modern Steam Locomotive..... 323
Machine Tool Builders' Convention..... 324
Train Accidents in the United States in March.... 329
The Bagdad Railroad..... 331
GENERAL NEWS:
Technical..... 331
The Scrap Heap..... 332
Meetings and Announcements..... 333
Personal..... 333
Elections and Appointments..... 334
Locomotive Building..... 334
Car Building..... 334
Bridge Building..... 335
Railroad Construction..... 335
General Railroad News..... 336

Contributions

English and American High-Speed Trains.

Mr. George G. Tunell, of Chicago, writes to protest against Mr. Acworth's assumption, in his letter which appeared in our issue of April 15, that Mr. Tunell had drawn unwarranted conclusions from the records of fast trains on English railroads. "I did not make an attempt to 'demonstrate' the overwhelming superiority at every point of American train service over British. This must have become immediately apparent to Mr. Acworth had he taken the trouble to read my article, before jumping at a conclusion concerning it." Mr. Tunell justly objects to being accused of error, even by implication, on the mere assertion of a third party. It is proper to add that our own omission to test Mr. Thompson's interpretation of Mr. Tunell's study (which omission, no doubt, led our English correspondent to assume that Mr. Tunell was a tail-twister) was due to the feeling, which seems to be shared by all careful students of the subject, that most of these statistical comparisons which allege the superiority of one country over another are vanity and vexation of spirit. Mr. Tunell has gathered some interesting facts concerning European trains; but when one sets out to make an intelligent or a useful mathematical comparison between Germany or England and America he takes a large contract. "He that increaseth knowledge [in certain directions] increaseth sorrow."—[EDITOR.]

The Tensile Strength of Concrete.

Pittsburg, Pa., April 22, 1904.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the issue of April 22, 1904, there appears an article by Professor W. K. Hatt on concrete-steel beams. A formula is given for the maximum bending moment on a beam which is quite simple in form and of easy application, but the formula contains a factor *t*, which is the tensile strength of concrete. Now, as the tensile strength of concrete is the most variable and uncertain quality which it possesses, and a factor in the strength of concrete-steel beams which is ignored by some, it does not seem to me that a formula in which the strength of a beam is made to vary directly as this uncertain quantity, is a stable basis upon which to design structures. The elastic limit or a safe tensile strength of steel, or the ultimate compressive strength of concrete, or a safe compressive strength of the same are quantities which can be depended upon with some certainty. Professor Hatt's formula would be used with more confidence if it contained as determining factors some more reliable quantities than the tensile strength of concrete.

EDWARD GODFREY.

Damage Suits in Texas.

New York, April 26, 1904.

TO THE EDITOR OF THE RAILROAD GAZETTE:

To those of your readers who are interested in the ethical study of the Republican form of government which the constitution of the United States is supposed to preserve to us and our children and to those who have watched the outrageous performances of certain public officials in the state of Texas, under forms of law, I should like to repeat some facts which I lately learned from a railroad officer in that state. I know that such readers will be interested, for the goings on in Texas have been in some respects more remarkable in their lawless ingenuity than have been heard of in any other state. The reader has, no doubt, read the cheering news which appeared in your columns on April 8, when you told us that our man, Mr. C. H. Markham, had actually halted some of the law-abiding highwaymen; but it will also be remembered that the misdoings of the "damage-suit lawyers" have been widespread and long continued, as shown in previous accounts,* and it will readily be understood that the evil is not likely to be cured in a day. There is still the crying need of a thorough exposure.

This railroad officer writes as follows:

"The Auditor has just come into my office with papers relating to a judgment amounting to $190, which we are called upon to pay. . . . A party with a carload of steers appeared at one of our stations one morning about three years ago, for shipment. It happened that the loading pens were being moved at that particular time, and were not ready to accommodate the cattle. He was told by someone to drive his cattle to the next station. It was not anyone connected with the railroad, because they all knew that there were no pens at the next station. Nevertheless, he drove them there, and finding no pens, drove them back to his home, about five miles. He presented a claim to the superintendent for time lost in driving these cattle. The superintendent, who is Texas born and knows all about cattle, estimated that $5 would cover all the expense incurred and offered him that amount. He sued and secured judgment for an amount, which, with the costs, we are paying to-day, by making a check for $190. That is the way justice (?) is administered in Texas.

"Last week a judgment was rendered against us in a case that was tried before a county judge, without a jury. About two years ago we had a washout, and were compelled to transfer passengers, baggage, mail and express by wagons for two or three days. On the morning of the second day an alleged minister of the gospel presented himself at the station and asked for a ticket to a station beyond the washout. The agent told him that there was a washout two miles off and that a transfer would have to be made, and as there was no train until five o'clock in the evening, he would have to come back for his ticket, which he did. On paying for the ticket he asked for a receipt for the amount. The agent told him that the ticket was a receipt, but he replied that that wasn't enough and the agent gave him the receipt. A bystander who witnessed the transaction asked him why he insisted on having a receipt, and his reply was that he might have use for it. At five o'clock he took the train and rode to the break, where the superintendent was on hand with teams and men to transfer passengers and baggage. There happened to be a good many women and children that day and they were loaded first, leaving no room for the 'minister.' He was told, however, that the teams would come back in half an hour and haul him and his hand-bag around the break. We heard nothing more from this person for about two weeks, when a communication from an attorney was addressed to the railroad company, calling attention to the fact that this minister of the gospel had been compelled to walk a mile and a half in the July sun and was damaged to the extent of $400. No attention was paid to this communication. A few weeks later a similar one was received, to which no attention was given. In a few more weeks we were confronted with a citation to appear before a County Court to answer in the claim of this alleged minister of the gospel for $1,000 for damages sustained by reason of being compelled to walk a mile and a half. Our attorneys and witnesses went to the county seat of the county in which this case was sued, a roundabout journey, five or six times, at a cost of several hundred dollars. Finally the case came to trial, and the honest (?) and intelligent (?) judge, who was candidate for re-election, awarded this alleged minister $450 for having walked a mile and a half; and this in the face of the testimony of a half-dozen witnesses who knew the man and saw the transaction and testified to what I have outlined. The 'minister' swore that he didn't know that there was a washout, although he had hung around the station a mile from it about eight hours, after having been told the fact by the agent. He swore he was compelled to walk, in the face of the testimony of the superintendent, the man who had charge of the teams during the transferring, the conductor of the train and one or two passengers who testified that he was told that, by waiting half an hour he would be hauled around the break. That is an example of justice (?) in Texas. I refer to these two cases because they are recent. There are many on file in different courts more outrageous than these two and for larger amounts.

"The conditions in the live stock traffic are so bad that you will scarcely believe me. Every shipment made on our road, except those from about four reputable people, engaged in that business, is followed by a claim. The railroad commission compels us to haul men with every shipment of stock that is made, who manufacture, en route, evidence against railroad companies and then appear as witnesses in court. Some day, after several days have elapsed in which my attention has not been called to some outrageous claim of this kind, I may be able to compose myself sufficiently to say something on the subject.

"I am this moment handed a telegram from an agent, who has just had two citations served on him to answer in two separate claims, for alleged damage to stock shipments. One of these claimants is a scoundrel to whom a court awarded nearly $2,000 a few weeks ago on a claim that he presented 18 months after his shipment was made, the presentation at that time being occasioned by the General Freight Agent's refusal to pay him $20 for having come into town from his ranch to give some directions as to changing the route of a shipment that he had on the road."

This is not the whole of my Texas friend's letter, but it is sufficient to give a true picture. What essential difference is there between the condition in Texas at the present time, as here described, and that which prevailed there previous to 1845, when the pistol was the universal arbiter? In forms there is a great difference, but might makes right, the same now as then. B. G. S.

*Railroad Gazette, 1900, page 723; 1903, page 910.

Mr. Priestley's Report on American Railroads.

Mr. Neville Priestley, Under Secretary to the Government of India, Railway Department, visited the United States some months ago and made a rather extended study of the organization and working of American railroads with particular reference to available points of comparison with the railroads of India. The results of his visit are now printed by the British Government in a pamphlet of 128 pages, of the 8 in. x 13 in. size customary for British Government documents. Mr. Priestley has been an exceedingly active railroad manager in India for some years. He acted as an exhibitor and expounder of the Indian railroad system to Mr. Robertson, when that gentleman was sent out by the British Parliament to make a report on the railroads of the country, and it is not at all extravagant to say that no better authority exists on Indian railroad conditions of the present time than Mr. Priestley. In view of this fact his report on American working has great interest. Unlike Colonel Yorke, who compared American railroad methods with those of a small, densely populated, and wealthy country, Mr. Priestley looks back to the great stretches of territory in India, where the necessity of "getting there" cheaply, and opening up the country—so important in early American railroad building—is the first consideration, and refinements of practice are secondary. Mr. Priestley is very much impressed by American energy, by the speed and directness with which matters are attended to, and by our various labor saving devices as applied to the railroads, and he devotes his last chapter to these devices, taking up tabulating machines, calculating machines, card index systems, etc. The American practice of judging things and men by results, of giving the head of a department a free hand, so long as his results are satisfactory, seems to impress Mr. Priestley as fundamental, as does also the control of waste by the standard of test applied through statistics, in accordance with which he notes that all extravagance is soon reflected in the cost of operation per unit, and that the effort of every one is directed toward keeping that unit cost down and to doing nothing which will tend to increase it.

In his observation of the policy of judging by results, Mr. Priestley says: "As a consequence of the confidence placed in them, men were not afraid to take responsibility, and they all seemed imbued with a sense of their responsibility. They were not haunted by the fear of this or that regulation, or the knowledge that some one was on the lookout to trip them up. They did their duty fearlessly, striving to secure what, in their judgment, seemed to be the best results for their employers, and knowing that if they did sometimes make a mistake, allowance would be made for errors of judgment." It seems as if in this brief paragraph Mr. Priestley had pretty nearly brought out the differences between governmental and private regulation of corporate enterprises. He speaks again and again of the advantages of being able to act on one's own initiative and of freely cutting red tape, and it is quite clear to any one familiar with the elaborate colonial organization of the British Government, that the contrast must impress the manager of railroads in India very sharply. Mr. Priestley is also impressed by our young officers. He says: "To conduct the business of the several departments in the different grades under present conditions in America, men of high attainments are necessary, and a close watch is always kept on all employees to find men of education, ability, energy, and steadiness of character. Where such men are found, they are not slow in rising, and the fact that every man feels that his advancement depends on his own personal efforts acts as an incentive on all to do their best. In advancing men the claims of seniority are not ignored, but the chief and almost the only claim to advancement is suitability for the position to be filled. Considerations of age are never allowed to affect the selection, and I found general managers of large systems men under thirty-five years old, and I met presidents and vice-presidents who had attained their positions at that age, the view held being that a bright, energetic, intelligent, ambi-

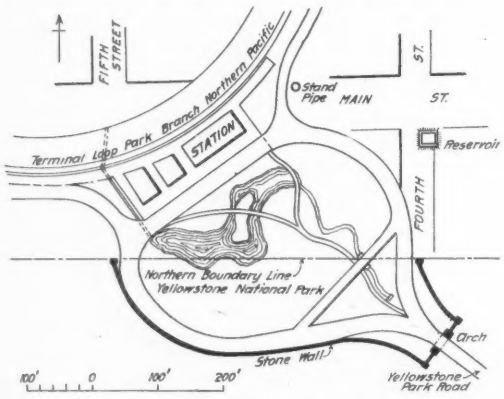
tious man would bring the concern in the way of business, or save it by economical and intelligent management, a great deal more than he would lose it by a deficiency of age as reckoned by years."

In discussing the general question of American freight rates as developers of the country, Mr. Priestley becomes a good deal of an economist. He says: "The consumers of the world may be divided into a series of concentric circles, each ring formed by those circles representing people of a certain purchasing power. The ring nearest the center of the circles is necessarily the smallest, and contains just a few people of extreme wealth. It does not need much of an increase of the radius to pass from the class having one purchasing power to the class having the next lower purchasing power, and as each increase in the radius is made, the area of the ring, and, consequently, the number of people in that class, increases out of all proportion to the number in the previous ring, until finally the outside ring is reached, which represents the people with the lowest purchasing power, who constitute the largest class of every community. The object of commerce—and railroad transportation is commerce—is to try and reach this widest class. Any increase in the volume of business reduces the cost of production per unit, as also the profit necessary on the sale of each unit to yield the same returns. . . . Any improvement in the method of production further tends to lower the cost per unit, and every reduction of cost will bring the commodity within the purchasing capacity of an ever-widening ring of consumers. This is what happened in America. Previous to the lowering of the rates by competition, consumption of many commodities was confined to a limited class of people, and by that class in a limited quantity. The lowering of rates brought these commodities not only within the reach of a wider class of consumers, but enabled the previous consumers to increase their consumption. . . . To restore the railroads to solvency it was not possible to put up the rates, even if this had been desirable with the experience before them, and the railroad officials were forced to devise methods which would permit their carrying traffic at these low rates and at the same time earn a dividend for the stockholders. The alert American mind was not long in devising these methods, and to-day railroad rates for freight traffic, judged as a whole, are lower in America than in any other country in the world, including India." The average rate in 1902 per ton of 2,240 lbs. per mile in America, Mr. Priestley gives as 8.4 mills, as compared with an average rate for all India, which he gives as 9.4 mills. It is a curious fact that the aggregate railroads of India and the aggregate railroads of America each earned enough net in 1902 to just pay 4.92 per cent. on the total capitalization. The term capitalization, however, as used in India, means simply the actual cost of constructing the railroads plus the premiums paid by the government in purchasing such railroads as have been acquired by the state, and this capitalization in India amounted in 1902 to $45,019 per mile of line open, as against $59,930 per mile in the United States. In qualification of the statistics showing the rate charged for freight traffic, which in the aggregate was less in America than India, Mr. Priestley prints tables showing that with the exception of two railroads, the Chesapeake & Ohio and the Pennsylvania, the average rate, taking the entire business done, is lower on the East Indian Railway than on any other of the dozen or so American railroads whose operations he examined. Except for the East Indian, however, the American rates are quite uniformly lower than the Indian rates.

In comparing labor costs, Mr. Priestley has obtained an average from the whole of the United States, and compares a monthly rate of $115.20 for American engineers, with $80 for European Indian engineers and $13.33 for native Indian engineers. The table is carried through to track men, which, according to the author's figures, receive an average of $37.50 per month in America, and of about $2 per month in India!

It is impossible to take up in detail all the interesting comparisons in this report, which examines quite minutely such features of American practice as the author thinks may be of value for India to know. In his own words, he came rather to learn than to criticize, and his attitude throughout is that of the expert and clear-sighted student. Copies of this interesting document can be obtained from Eyre & Spottiswode, London.

Northern Pacific Station at Gardiner, Montana, Showing Train Platform.



Map of Grounds About Station.

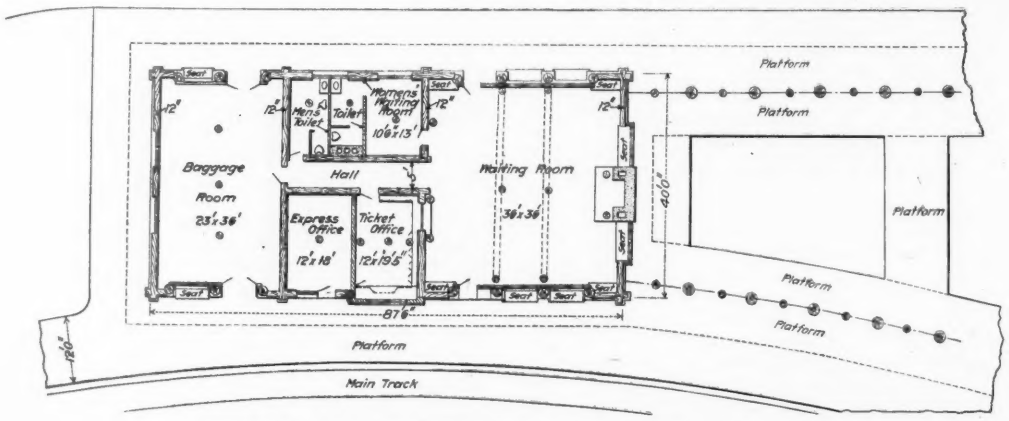
Unique Passenger Station on the Northern Pacific.

Gardiner, Mont., is located at the southern terminus of the Park Branch of the Northern Pacific on the northern boundary line of the Yellowstone National Park, and is the point where a large number of passengers leave the railroad for the several days' trip through the park on the coaches of the Yellowstone Park Transportation Company. The Northern Pacific has recently built here a new passenger station of unusual design and arrangement. The illustrations include a plan showing the location of the passenger station, the railroad line and the Yellowstone Park road. Trains are received on a single-track terminal loop which is operated toward the east to enable the trains to pull by the team platforms. The main highway leading from Yellowstone Park emerges from the park on the opposite side from beneath a massive stone arch and forms a loop past the station around which traffic is deflected in the opposite direction to the railroad loop.

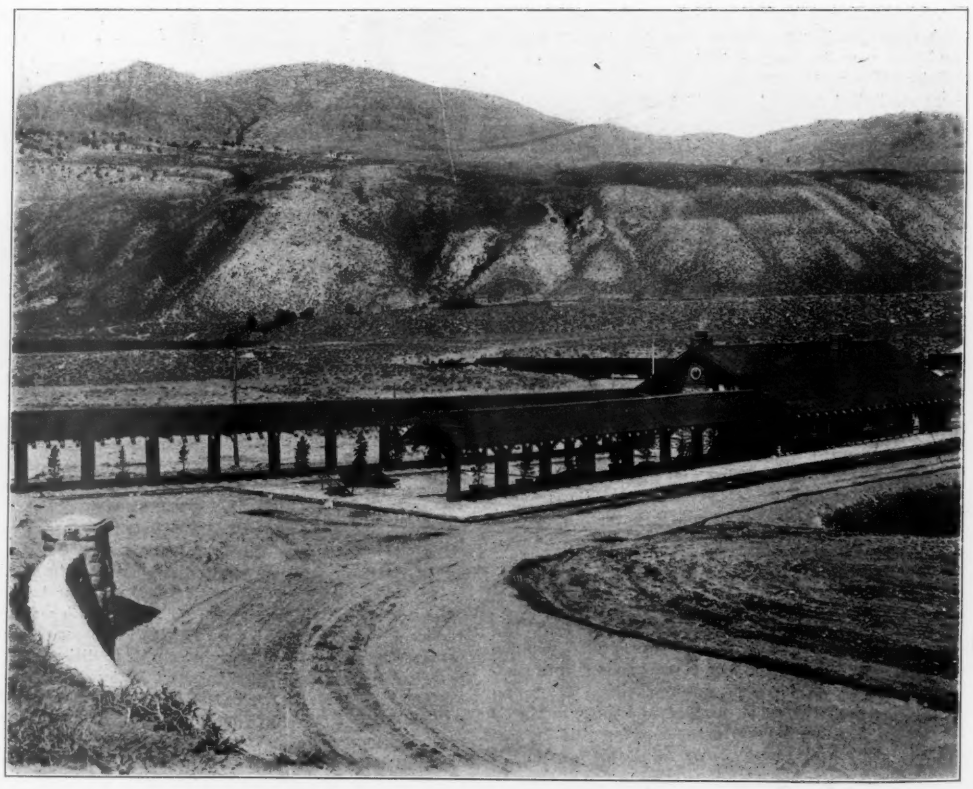
The grounds about, and in the rear of the station are nicely parked, there being within the highway loop a lake, lawns and shrubbery. The arch at the park entrance was designed and built by Major H. M. Chittenden, U. S. Engineers, in charge of the extensive improvement work which had been done in the park, and with its massive lines, rough finish and graceful design, is especially attractive. The corner stone of this arch was laid by President Roosevelt at the time of his trip through the park about a year ago. From each side of the arch there extends a stone wall of the same design and material, the one on the western side continuing around the loop to a point near the platform. One of the photographs taken from the direction of the arch shows the terminus of this wall. All of the park highways and also the loop back of the station are well built, with easy grades and curves, and are macadamized.

The improvements in general throughout the park are substantial, commodious and artistic. The hotels are large and attractive, several possessing unusual features of architectural design. That at Geyser Basin has 130 rooms and is of a rustic design similar to the Gardiner station. The highway bridges are of a permanent character, a number being large concrete arches. The station at Gardiner was designed to harmonize with the other structures. It is essentially rustic and is built of native materials. The foundations and lower parts of the walls are rough boulders. The walls above, including the platform shelters, are made of unbarked logs. The roof trusses, gables and ceilings are finished with similar material.

The interior contains a large waiting room with fireplace, ticket office, express office, baggage room and toilet rooms. The rustic effect of the exterior is also carried out in the interior, the doors, windows, settees, chan-



Floor Plan of New Northern Pacific Station at Gardiner, Montana.



Northern Pacific Station at Gardiner, Montana, from the Park.

deliers, hardware, etc., all being in keeping with the general design. The projecting ends of logs are smoothed and polished, and where lumber is used for finishing it is of high grade and finely polished. Wrought nails, bearing on their heads the trade-mark of the company, are used wherever they will show. The fireplace at the end of the waiting room is broad and forms a pleasing feature of the interior.

The combination of highway and terminal loops, with the station between, is considered by the company to be a particularly convenient arrangement, while the harmonious effect of the station and its surroundings, with the arched park entrance in the background, is unusually attractive.

The photographs, drawings and information were furnished by Mr. E. J. Pearson, Acting Chief Engineer.

The Upbuilding of a Railroad System.

BY CLARENCE DEMING.

The New York & New Haven Railroad, the basic stem upon which a great system has since been built up, was chartered by the Legislature of Connecticut in 1844, the original grantees being J. E. Sheffield, S. J. Hitchcock, W. A. Reynolds, Nathan Smith, N. R. Clark, P. P. F. De Grand, S. S. Littlehale, Elihu Townsend and Anson G. Phelps, whose first name is perpetuated in the Connecticut city of Ansonia. The charter authorized a line of railroad "from some point in the city of New Haven, and thence westerly to Bridgeport, and thence westerly to the west line of the State of New York," the maximum capital being fixed at $3,000,000; and a certain prophecy of the future appears in special authority to build single, double or triple tracks. Four years elapsed before the line was partly opened (1848) and not until the following year (1849) was there full service over the seventy-seven miles between New Haven and the Canal Street station of the Harlem Railroad Company in New York. The interim was filled with pain while the new enterprise was being born; subscriptions to the original $2,500,000 came slowly, one of the contractors had finally to take part payment in stock and the project devolved upon a few men; the Westchester Turnpike Company and the Harlem Railroad Company resisted successfully in the New York Legislature the efforts to secure charter rights of trackage in that State and the privilege was secured only by an expensive compromise which reaches down to this day and but for which the New Haven Company would probably now have its own large terminal in the heart of New York city; other expensive compromises had to be made with the Sound steamboat companies, then almost monopolizing the traffic to and from New York and jealous of the new competitor; and the "Canal" (New Haven & Northampton) railroad had to be taken over under a lease which for several decades was to prove a serious and vexing burden. Hardly had the line been opened under its first president, Robert Schuyler,—a name afterwards to be black-lettered in its history—when stockholders made charges of malfeasance. There were allegations of what would now be called "graft," of undue profits of contractors, of excessive, if not spurious, issues of stock. But an investigating committee reported that it had found no evil, though, in the light of later disclosures, there must be solid suspicion either of shallow research or of a deliberate "whitewash."

EARLY EQUIPMENT AND SERVICE.

At its opening the road, 64 miles long from New Haven to its junction with the Harlem line, was capitalized at $2,500,000, with a small debt. Its cost of construction was returned as $2,397,790, with cost of $217,333 for equipment consisting of ten locomotives (wood burning), 38 first class and 8 second class passenger cars—the 46 cars costing $88,608—and baggage, freight, flat and hand cars not enumerated separately, costing altogether $36,700—the meagre equipment of freight cars suggesting the low traffic in that branch which for years was to supply only about one-sixth of the total receipts. Out of the 64 miles of single trackage 43½ miles is returned as "straight line." A faded time table of two years later (1851) supplies some interesting details of the service. There were six passenger trains daily from New York to New Haven and five from New Haven to New York, the ordinary passenger train making the 77 miles in three and one-half hours, and the swiftest in three hours; and there were no night passenger trains and only two freight trains. But, perhaps owing to rivalry of the boat lines, passenger rates were very reasonable in a tariff fixing $1.50 between New Haven and New York and about two and one-fourth cents a mile as the local rate, with a commutation rate of $100 a year between the two cities. In the first years, net earnings, which might better have been laid out in improvements, were used for moderate dividends, very likely to expand the credit of the company for reasons under the Schuyler policy which will be evident later. But there was an abrupt change following two calamities, the first dating May 6, 1853.

THE NORWALK BRIDGE DISASTER.

On that day the passenger express running through to Boston and made up of two baggage and five passenger cars carrying about 150 persons, left New York at 8 o'clock A. M., in charge of an inexperienced engineer, who, as substitute, had made but two previous trips over the line. At Norwalk, where a navigable estuary runs up for several miles from the Sound, the engineer, for some reason not explained, until a few hundred feet from the local drawbridge failed to see the ball at the masthead, which in those days and for many years after on the line signalled that the draw was open. He gave the whistle for brakes, reversed the engine and with the fireman leaped to safety. But the train went on with scarcely diminished speed. The locomotive and tender leaped across the draw to the opposite abutment, falling back into 12 feet of water followed by the two baggage and two of the passenger cars, the third passenger car breaking midway and checking the rest of the train. Altogether 46 persons lost their lives, many of them by drowning, and about as many were seriously injured. The accident, the worst up to that time in the annals of American railroads and peculiar in its horrors, came with a shock not outgrown in Connecticut for many years and even now often retold by old men; it sowed a crop of damage suits very baleful for the company; and in the Connecticut Legislature it was followed instantly by the passage of an act compelling all trains to make a full stop not less than 200 feet from a draw—an act not even modified until a few years ago when, with the adopting of a derailing device near drawbridges, it was enacted that the State Railroad Commissioners "may, in writing, authorize the passing of any such draw * * * without stopping as aforesaid, when, in their opinion, it can be done consistently with public safety." Violation of the act is penalized with a maximum of $100 fine and three months' imprisonment for every person running the train and $500 fine of the president and directors of the company.

Interior of Waiting Room, Northern Pacific Station at Gardiner, Montana.

THE GREAT SCHUYLER FRAUD.

The second disaster came 14 months later, was of a different type, but was far more calamitous in its financial consequences to the New Haven Company. Almost forgotten now and veiled by half a century of years, it introduced the generation of its time to financial misdeed on a scale of magnitude, craft, boldness and system not equaled even in the later chapters of Erie.

The reversed hero of the great fraud, which all but wrecked the New Haven Company, was Robert Schuyler, head of the firm of R. & G. L. Schuyler, of New York City, described in the city directory of the period as "engineers," but their vocation in practice expanding into a banking business, contracts for railroad construction and general financing of railroad projects. Robert Schuyler, himself, besides his presidency of the New Haven Corporation, was a prominent officer in several other railroad companies. Up to the time of his fall he bore a high reputation for financial ability as well as rectitude, and had no expensive tastes or vicious personal habits. In the management of the New Haven Company he was trusted implicitly and the incautious directors had made him stock transfer agent in full charge of the office and transfer books in New York City.

Late in June of 1854 the uncommon abundance of New York & New Haven stock in the market and offered as collateral security for loans had begun to attract some attention and about that time a director of the company received an anonymous letter asserting that the president had issued spurious shares. The letter was ignored and, so far as contemporaneous history reveals, the director did not even mention his warning. But on July 3 another director received a short note of a different and more alarming quality. It was from President Schuyler himself, and in brief but pointed terms stated that an examination of the books would show a large over-issue of stock, adding that his brother, the second member of the firm, had taken no part in the fraud and was in absolute ignorance of it. The directors lost no time in getting at the books and found a state of affairs positively astounding. It appeared that Schuyler, in his double function as president and transfer agent, had for five years and from the first opening of the road, been issuing spurious stock certificates, most of them to his firm, through whose endorsement by himself they had been floated into the market. Though at first used largely by the firm as collateral for loans in extensive railroad enterprises, the stock had later gone to all sorts and conditions of men—and women—to trustees and corporations, and during the five years had passed and repassed through the transfer books of the company in the hands of several hundred holders. The genuine stock of the company was $3,000,000, represented by 30,000 shares; the spurious stock was $1,954,000, represented by 19,540 shares.

A fraud so dramatic and of such magnitude would shake modern Wall Street. On the restricted Wall Street of a half century ago it fell like a thunderbolt, particularly as, in connection with it, was disclosed a small over-issue of Harlem stock and rumor and suspicion of other frauds began to fly. "The Street," for a few days quaked; pulpit and press fulminated; heads of other railroad companies dashed into print to tell how impossible such fraud would be under *their* system of stock transfers, and New Haven shares, with sales suspended on the Exchange, fell from 81 to 40 and Harlem from 45 to 25. Yet, perhaps because the legal *status* of the over-issue was undetermined, there was no real panic and the convulsion was moral rather than material. The Schuylers, of course, assigned with liabilities stated at several millions, but only one other large firm went to the wall. Among the newspaper reports of the week of financial stress may be noted one asserting that Cornelius (Commodore) Vanderbilt, a creditor of the Schuylers and innocent holder of some of the spurious stock, visited the New Haven president and offered to "see him through" if assured that he was "all right," but was answered only by a mournful shake of the head; and there is another story of how the president, on the verge of exposure, "roasted" a conductor for a trifling error in his account. Schuyler, at first reported "sick" at his home, disappeared, and except a vague rumor of suicide, no tale of him has come back. The mystery of his payment of dividends on the inflated stock seems explicable only by drafts on his own bank account.

SEQUELS OF THE FRAUD.

For the New Haven Company the great Schuyler fraud left behind a long wake of woes. The stock transfer books were closed instantly, to remain shut for a number of years. Next came the protracted and complex task of sifting out the original and genuine from the spurious stock, and, finally, the company embarked on what for long years seemed a shoreless sea of litigation. On its first contention carried up to the New York Court of Appeals the company won. It was held that the company having reached the charter limit ($3,000,000) of capital, the Schuyler stock *per se* was absolutely void in law and the corporation not responsible for it. But quite otherwise was the sequel when the courts came to pass on the question of damages to an innocent holder through the acts of a duly authorized agent of the corporation. Here the New York courts found strongly against the company in a great case brought by a bill in equity—styled the "omnibus" suit—"lumping" all the actions so as to protect the company from a whirlwind of lawsuits and deciding the question once and for all. In its decision the court lays much stress on the contributory negligence of the company in the large and almost unrestricted powers given to Schuyler as president and transfer agent. Through more than ten years of time the flood of litiga-

tion pours, the "omnibus" case alone filling three bulky printed volumes, with almost every prominent New York lawyer as individual or general counsel and names like those of William M. Evarts, Charles O'Conor and Wm. Curtis Noyes in the foreground. In 1855 the Connecticut Legislature passes an act authorizing an additional issue of $2,000,000 stock to compromise and adjust the claims, but with the express stipulation that the act shall not be construed as legal recognition of the spurious stock. In 1860 the president of the company, in his annual report, voices his dirge that "it is not difficult to arrive at the conclusion from the previous annual reports of your directors, that the difficulties and embarrassments environing this corporation in 1854, after the flight of Robert Schuyler, have no parallel in the history of railroads." At last comes the end of a tale which reads like Greek tragedy applied to railroading. In 1864 the company offered one share of new stock for each share of the spurious issue and 155 holders, representing about two-thirds of the spurious shares, accept. In 1866 the president reported that all adjudicated cases arising from the Schuyler fraud had involved to date total payments of $1,599,202, and in 1867 and 1868 there was paid $173,666 more, apparently closing at the end of 14 years, with total payments of $1,772,868, the dreary tale of loss. Even so late as 1861 there was brought in the Connecticut courts a suit on stock held as collateral by a Bridgeport bank and issued by Schuyler in 1849 at a time when his firm held 160 shares of genuine stock; and the court practically found the bank's stock valid in the absence of evidence distinguishing it from Schuyler's *bona fide* shares—an incident of the prolonged litigation which discloses one of its many snarls. Altogether the Schuyler fraud probably cost the New Haven Company in new stock, damages and lawyers' fees not less than $3,000,000, or a sum equal to its whole legal outstanding stock in 1854, when the fraud was first uncovered.

But the protracted and dark financial cloud had, after all, its silver edge. During its long suspension of dividends the company could improve roadbed, lay a double track and add to equipment, and the close of a calamitous experience, which would have wrecked most corporations, found it firmly on its legs.

OLD-TIME SALARIES AND WAGES.

Some entries of the annual reports of the period are interesting in their suggestions on old-fashioned railroading. In 1860 a complete return of salaries and wages shows that the president received a salary of $5,000, the treasurer $2,500, the superintendent $2,500, the chief clerk $2,000, engineers $70 a month, conductors $60, baggagemen and brakemen $35, and firemen the same. In 1865 a return of "free passages" during the year shows 472 issued to officers of connecting roads, 23 "on company's business," 136 to telegraph, mail, express, police and government agents, and 53 "not designated"—a total of 684 free passes for the year.

A somewhat striking feature of what may be called the New Haven's period of calamity following the Norwalk disaster and the Schuyler frauds was the failure of its business to increase, notwithstanding considerable growth in population and industry of the territory served In 1853 the total receipts of the company were $806,604, of which $666,283 was from passengers and $120,315 from freight. In 1863 the total had risen to but $899,642, of which $694,753 came from passengers and $181,092 from freight; and though some allowance must be made for the early effects of the Civil War on railroad business, the comparative figures fairly reflect the condition of the New Haven's traffic during the interval. "The wide disparity between freight and passenger traffic will naturally attract attention. But it and its causes as well as a very impressive phase of the New Haven's history which it denotes, will be the subject of more prolonged and careful analysis later.

A TRANSITION PERIOD—CONSOLIDATION BEGUN.

The history of the New Haven Company for the period of about 20 years (1868-1887) following the last vestiges of the Schuyler frauds may be described as interesting rather than sensational. It opened, to be sure, with the discovery of a shortage in the treasurer's accounts which, for the moment, revived the chills and fevers of the greater fraud—dissipated when the official statement showed a default of *only* $88,255. In 1868 the long and burdensome lease of the "Canal" road terminated and a more profitable agreement was substituted. As showing the safe operation of the passenger department, the president reports for 1871 that during a period of 17 years "25,405,708 passengers have been carried without loss of life or limb." Then came the first beginnings of the new era of consolidation. In 1871 a new traffic agreement with the New Haven, Hartford & Springfield line is followed by legal merger under the New Haven control. The New Haven becomes in a sense a "trunk" line, with stock capital raised from $6,500,000 to $15,500,000, where it is to remain for many years. In 1873 the Harlem and Portchester line—started as a competing parallel—is taken over from its financially troubled promoters, to become, with its valuable terminal, a most vital branch of the New Haven system. Later the Shore Line is leased—not to pay its rental for some years, but, ultimately, to become part of the main stem, and the Boston Air Line also goes by lease to New Haven control, as does by purchase the "Canal" (New Haven & Northampton), its majority shares passing at a high price when sought by the Boston & Albany as part of a projected through extension to New York—a project which, if consummated, would have changed the whole railroad face of Southern New England. Meanwhile four-tracking of the New York Division is begun; iron bridges begin to replace those of wood, and coal supersedes wood as locomotive fuel; the roadbed is improved and running time accelerated; new stations go up and the block system is adopted; and the president reports for 1886 that, as the result of a reduction of fares on the main line to two cents a mile and corresponding reduction on two of the branches, the train mileage of passengers has been increased by 23,000,000. It must not be omitted that the early part of this 20-year period touched the funny old times when from the Canal and 27th street stations the cars were drawn by horses through the 34th street tunnel to the present site of the Grand Central Station, where then only open fields, big rocks and Shantytown broke the line of the horizon.

But while the general story of the corporation during the two decades under Presidents Bishop and Watrous is one of financial prosperity and physical progress, some of its annals are negative. The freight business is almost neglected and year after year shows no increase of freight rolling stock or receipts from the traffic save as they come with railroad properties acquired. After a stiff and successful fight in the Connecticut Legislature to beat off a "parallel" charter, President Bishop confesses in an annual report that the parallel scheme owed much of its support to complaints of the New Haven's service. This particular battle in the Connecticut Legislature, one of a number and a forecast of the great parallel contest of 1889, suggests that it was during the two decades in question that the New Haven Company crystallized its power over the General Assembly of the state; that it dictated on both sides the nomination of State Senators who might be Republicans or Democrats but must always be New Haven railroad men; that it organized the lobby on a scale before undreamed of and stamped the dollar mark deep on the state capitol—to stay there. The two decades of the corporation's prosperity were, in a civic sense, an epoch of the deepest shadow, which was later to creep over Rhode Island also. Weak and subservient railroad commissions in both states have offered no check to the eclipse of the legislative purities.

A YALE STUDENT'S DEADLY THESIS.

An episode of the time, not known to many, is worth recall. In the early period of the replacement of wooden by iron bridges the company had built an iron structure several hundred feet in length over the Housatonic River. It was graceful in design and an architectural poem in truss and chord, but organically and structurally feeble. Its weakness, however, was unsuspected until early in the 80s a bright young student in the Sheffield Scientific School at Yale took the admired bridge as the theme of his graduating thesis. He examined the structure, applied his formulas for strength of materials and demonstrated that the margin of safety was practically nothing. The thesis was submitted to the authorities of the school and its measurements and figures confirmed. Without delay and with the utmost secrecy the thesis next went to President Watrous, who was astonished to receive a confirming report from his own experts. The bridge came down forthwith and in his next report with a mild efflorescence of words on increased train loads, heavier engines and the outworn virtues of cast-iron chords and posts, blended with praise of the new structure "over which trains run as freely as they do over terra firma," President Watrous disguises a crisis which had cost him much sleep o' nights.

The coming of C. P. Clark to the presidency of the New Haven Company, which he was to hold for 12 years, was epoch-making in the history of the corporation. To two slow-going and old-fashioned presidents, both of them trained as lawyers and bound by railroad precedent, succeeded a man versed in most of the branches of railroad management, alert, active and, for those days, extremely radical, who, before he left the company was to change the railroad map of Southern New England. His general policy, his methods and their results open up a most suggestive story in the career of a strong and unique railroad personality.

THE GREAT PARALLEL CONTEST OF 1889.

Almost at the outset of his administration President Clark entered a tempestuous storm center of railroad conflict. Efforts extending over many years to secure from the Connecticut Legislature authority to build a parallel and competing steam line to the New Haven's main stem culminated at the legislative session of 1889 in a supreme and final endeavor. What was known as the Bostwick-Starbuck-Macaulay group of railroad capitalists had secured control of the New England, Housatonic, Danbury and Norwalk & New Haven and Derby roads, giving entrance to Hartford, New Haven, Bridgeport and other Connecticut cities and a certain territorial influence in Western Connecticut. The parallel scheme was at first masked in a subtle petition. It was asked that the Housatonic Company be authorized to build east and west branches from its Bridgeport terminal; that a charter restriction of its branches to 10 miles be enlarged to 30 miles; and, later, that the legal life of an old and practically extinct "parallel" charter be extended. At the same time it was asked that the Housatonic Company be authorized to issue some $5,000,000 of additional stock. The plan, in brief, was, with the Housatonic line as a base, to build up a competing parallel by a series of branch lines. At the same session, as it chanced, the New Haven Company petitioned the legislature for a large stock increase. Both propositions, under the Connecticut law, had to go for preliminary approval to the Connecticut Railroad Commission which, unwilling to offend either of the powerful rivals, gave to both plans its assent. And then the great battle, long to be remembered in the history of Connecticut railroad polemics, was shifted to the legislature itself.

The forces were not unequal; both had large funds; both had extensive local and territorial control, and both were aggressive, persistent, resourceful and skilled in the wiles of the lobby. The battle which followed under these stimulating conditions remains as a kind of unfragrant high-tide mark of legislative corruption in the commonwealth. There were two armies of lobbyists, two armies of lawyers and two other armies of "rooters," brought in by free trains to the committee hearings. The railroad committee sessions were long, wordy and acrimonious, and every expedient of individual pull and pelf was exhausted. Not unaptly in contemporaneous history was the three months' campaign described as a period when "the ship of state floated in an ocean of champagne, shored by greenbacks," and the statement was plausible that it was a very jocund period for lifting farm mortgages. Incidentally were disclosed the cases of two or three back country legislators of queerly distorted Puritan conscience who, after accepting the higher bribe of one of the roads, returned the lower fee of the other. The legislative leaders of the New Haven interests, as against the funds of their foes, dared not trust their traditional control of the Senate of 24 members and elected to make the initial fight in the lower house of 249—relying also on a nucleus of honest and intelligent representatives who saw in the "parallel" scheme, what it really was, a kind of piratical venture and a speculative "strike" of colossal magnitude. In the sequel the railroad committee reported 5 to 4 against the parallel project, and several sessions of forensic storm in the lower house ended with an adverse vote of 136 to 102 against the parallel. The after statement that the campaign had cost the two battling roads several hundred thousand dollars is easily credible.

PRESIDENT CLARK'S POLICY AND CHARACTER.

The bold and energetic policy of President Clark, in which he had at times some difficulty in taking his directorate with him, may be traced along several distinct lines. One was his rapid absorption of connecting roads by lease or merger. During the first year he took in by lease the Naugatuck road, a large feeder of freight. In 1892 by agreement with its directors he merged the New York, Providence & Boston system—this by the device of a seven per cent. lease of a ten per cent. stock and a transaction in the nature of a "freeze out" that reads a bit grotesquely now when the New Haven Company seeks condemnation by eminent domain of minority stock and needs to enter court with clean hands. With the property came three Sound boat lines to which two boat lines were added soon after by the lease of the Old Colony system—territorial occupation being thus supplemented by a defensive navy on the sea. Next, in swift succession, came in the Housatonic system, extinguishing the last vestige of a Connecticut parallel, and the New England—after a battle in Wall Street with the Vanderbilts for the majority shares—with yet another boat line as an annex. Meanwhile President Clark was adding by purchase to the Harlem terminal signing new traffic agreements with the western trunk lines, developing the transport service around New York City and adding immensely to freight facilities at the terminal and along the line of the Harlem and Portchester branch; four-tracking the New York Division and double-tracking the Shore line to become ere long a part of the main stem; planning and financing the great South Station at Boston; laying down the first lines of an electric policy, to be sketched later in this article, and extending the block system and, by mileage books, the two-cent-a-mile fare to the subsidiary lines.

The contrast between the New Haven system as President Clark took it in 1887 and as he left it in 1889 is both impressive in itself and instructive as the work of a single railroad administration. It appears in the table annexed:

	1887.	1899.
Length of road owned (miles)	141	448
Length of road leased	125	1,569
Length of road operated under trackage rights	...	30
Total length of road operated	266	2,047
Reduced to miles of single track	524	3,986
	1887.	1899.
Condensed general balance sheet	$21,885,033	$100,240,422
Total construction and eqpm't acc't	16,437,605	59,072,090
Gross earnings from operation	7,724,393	37,143,917
Operating expenses	5,526,820	25,581,256
Total receipts	8,214,578	38,224,800
Total expenses	6,460,686	33,858,829
Capital stock	15,500,000	54,641,400
Debentures convertible into stock	.....	16,397,200
Dividends (1887, 10%; 1899, 8%)	1,550,000	4,158,088
Locomotives	133	917
Passenger service cars	411	1,816
Freight service cars	3,136	12,490

The dashing and absorptive policy of President Clark was not always successful and like other great generals in railroading he had his reverses. A defeat which had in it elements of the picturesque followed his premature announcement in 1892 of an agreement with the directorate of the Connecticut River Company for a lease of its road at 10 per cent. This was a direct invasion of the territory of the Boston & Maine, a system for which the pyrotechnical President McLeod was then planning traffic alliance with the New England and Reading. The directors of the Connecticut River had ratified the lease, but the confirmatory stock vote had not been cast. How McLeod, acting through a Boston firm of brokers, rushed into the Connecticut Valley, sought out the individual stock owners and, at a great price, bought up their holdings and thwarted the lease, is now a bit of remote but spectacular history. But it was that stroke of McLeod's, last of

his railroad antics, that scared the conservative Old Colony directors into the New Haven lease, and, as a sequel, came the New Haven-Maine alliance and so-called "partition of Poland," by which the two great systems took respectively Southern and Northern New England. Again, President Clark could not in 1897 take his executive committee with him in his unfulfilled plan of securing the Central New England and Poughkeepsie bridge; and at a greatly advanced price and after the costly and foolish and altogether disastrous "Montague farm" contest it has been left to President Mellen to complete the purchase which President Clark designed. But such small reverses do not impair the fame of President Clark, if, indeed, they do not confirm it. He was not a great railroad "operator;" he scorned detail; and at times and in places he no doubt spent money too lavishly. But he saw far beyond his railroad contemporaries; he anticipated by years the wave of railroad consolidation which, when it came, found his own property protected and intrenched; he was a pioneer in electric ownership and adaptation by steam roads; he was tireless as a worker, unselfish, devoted to the interests of his company, blending the old-fashioned New England honesty with modern ideas of enterprise; and, without a trace of official austerity, he was approachable, kindly and jocund, and one of the few great railroad architects who has left behind affectionate memories as well as successful administration.

(To be Continued.)

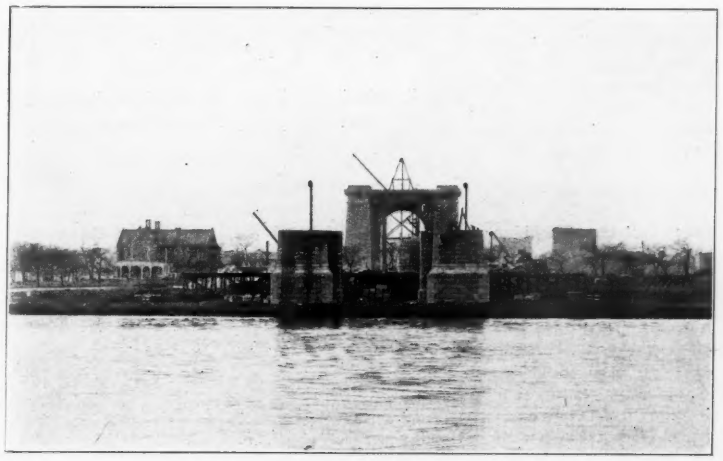
Mr. Parsons on Conditions at Panama.

William Barclay Parsons, of the Panama Canal Commission, returned from the Isthmus April 20. He is quoted as follows by the New York daily papers:

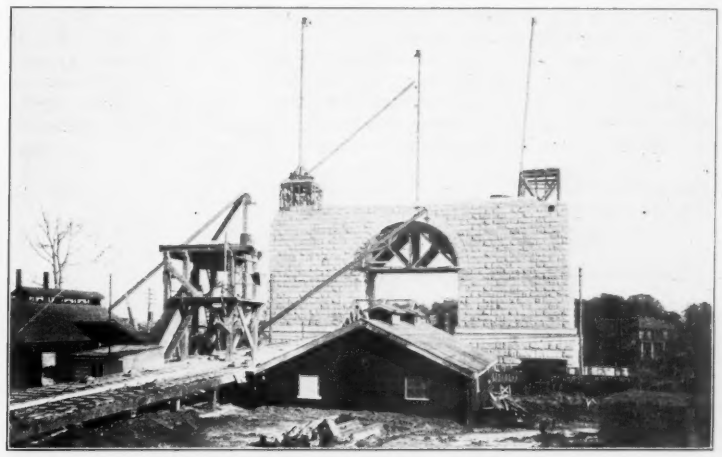
"The Commission arrived at Colon on Monday evening, April 4, after a pleasant and rapid voyage, and on landing the next morning were met by the officials at Colon. After an examination of Colon and its surroundings, the Commission on the next day proceeded to Panama, where we were formally presented to the President of the republic. The Commission then in a body began the serious labor of inspecting the work already done and studying the details of the work to be done. To this end they passed through, in boats, such portions of the canal as have been sufficiently finished to be navigable, examined at great length the celebrated Emperador and Culebra cuts, which form the most serious obstacles to construction, and traversed the Chagres River for some miles above the line of the canal, so as to study the details of construction necessary to control this stream, which at times of flood carries an enormous amount of water. The Commission also examined the various sites selected for locks, the site of a dam which has been proposed to be constructed at a place called Bohio, which would convert the central portion of the canal route into a large artificial lake, and sites for other dams as alternate schemes to the Bohio scheme. In all these examinations the engineers of the French company rendered valuable assistance with the information, maps and plans that they had prepared. The net result of these investigations is that, in my judgment, the construction of the canal is perfectly feasible, and when constructed the canal can be successfully operated. As to the details of the plans to be followed, it is, of course, far too early to speak. That decision rests on many questions which will have to be carefully studied by the Commission at some length in order that the best location may be followed. I had never been on the Isthmus before, but from all accounts had expected that the climate would be exceedingly disagreeable and with health conditions that could be improved only at great expense. In both these respects I was agreeably disappointed. The climate during my stay, although warm, was not so disagreeable as the extreme summer climate of either New York or Washington. As to the health conditions, while the present death rate on the Isthmus is considerably higher than the death rate in the United States, and is also considerably higher than the death rate should be on the Isthmus, I am confident that with a supply of good water furnished both to Colon and Panama, and with a complete system of sewers, supported by proper sanitary regulations vigorously enforced, both of these cities can be made healthful places of residence. At present neither city has made any attempt to secure drainage or any system of water supply, except such as is furnished by cesspools for the former and by cisterns or wagons bringing in water from the surrounding country for the latter. Steps were taken before I left Panama to begin investigations for the selection of a proper supply of water for both Colon and Panama. The Commissioners were accompanied by Drs. Gorgas and Le Garde, of the army, and Rose, of the navy, and Capt. Gillette, of the United States Engineer Corps, who were engaged in making investigations of the various hospitals heretofore established by the French company, and in looking into the general sanitary conditions existing on the Isthmus so as to determine what regulations would be necessary. I left the Commission in good health. Having completed with me the investigation of the leading features of the problem, they were to take up on my departure the questions of minor interest, which did not require a full board. These questions, however, require only a few weeks at the utmost, when I expect the rest of the Commission will return to Washington and organize the necessary engineer corps."

Masonry for the Blackwell's Island Bridge.

The accompanying illustrations of the nearly completed masonry piers for the new Blackwell's Island bridge across the East River, New York, give some idea of the massive proportions which the completed bridge will have. A complete description of the superstructure of this third bridge across the East River was given in the *Railroad Gazette*, Aug. 28, 1903, p. 616. The bridge extends from the foot of Fifty-ninth street, in the Borough of Manhattan, across the two river channels and Blackwell's Island to Ravenswood, in the Borough of Queens, and when completed will be 7,636 ft. long, including the approaches, which will be steel viaducts. The distance between anchorages is 3,724½ ft., and the river will be crossed with five cantilever spans, the longest of which is to be 1,182 ft. A minimum clear height of 118 ft. above mean high water will be preserved, and the clear height over the main channel will be 135 ft. The original design of the bridge was made by the Department of Bridges, Mr. John L. Shea, Commissioner, and Mr. R. S. Buck, Engineer of the bridge, some five years ago. Work on Pier No. 2, on the west side of Blackwell's Island, was begun soon after the plans were

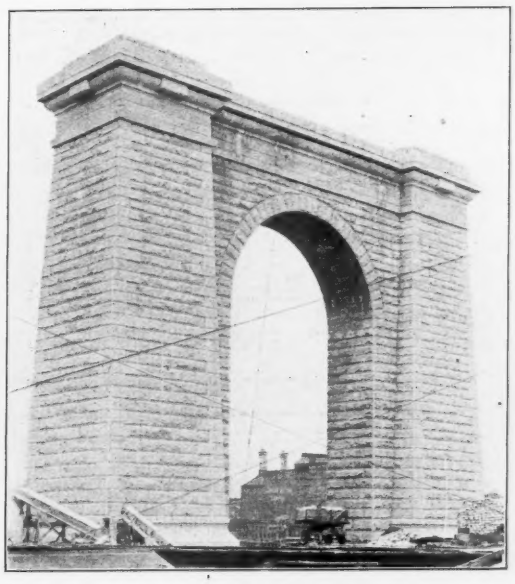


Piers 3 and 2, Looking West.



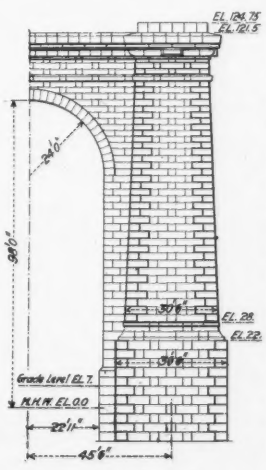
Queens Anchorage, Looking East.

Pier 2, Looking West.

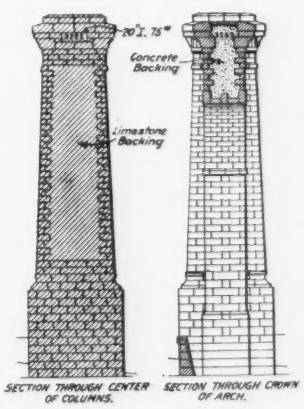


Pier 2, Completed.

Pier 4, Looking West.



Half Elevation of Pier 2.



Sections of Pier 2.

first adopted, but later when Mr. Gustav Lindenthal succeeded Mr. Shea as Commissioner, a new design for the superstructure was proposed and adopted. Work on the four piers under way was stopped because of some slight changes made necessary by the adoption of the new design. After the changes of the plans had been fully decided upon, work was recommenced on the foundations and piers and is now nearly completed.

There are four channel piers, numbered in order from the Manhattan shore, and two anchorage piers. The general design of all of them is the same, consisting of two square columns, with simple mouldings under the pedestals, and connected at the top by an arch of about 50-ft. span. The foundations were carried down to solid rock, which was found at a moderate depth. The general construction of piers and anchorages is rock-faced granite ashlar, backed with limestone masonry in the columns and with concrete backing over the arches. All of the quoins and mouldings are cut stone. The general dimensions of Pier 2 are shown in the accompanying drawing. The contractors for the work were Ryan & Parker, and the contract price for the substructure, entire, was $846,000. The principal estimated quantities in the substructure are 22,800 cu. yds. of granite, 14,000 cu. yds. of limestone, 17,000 yds. of concrete, 14,000 yds. of earth excavation, and 6,500 yds. of rock excavation.

One of the changes made in the first plans was the building of elevators in towers outside of the two island piers so as to give a means of reaching Blackwell's Island from the roadway above. These towers will be built by separate contract, the piers remaining unchanged as built.

We are indebted to Mr. H. A. La Chicotte, Assistant Engineer, Department of Bridges, for the photographs.

Turbine Express Steamers for the Cunard Line.

A recent issue of *Engineering* (London) contains a leading article from which the following is taken, regarding the turbine vessels which have been ordered for the express service of the Cunard line. The history of the turbine engine as applied to vessels is extremely recent, its practicability having been first demonstrated by the performance of the "Turbinia" at the Naval Review in 1897. Since then two Clyde excursion steamers have worked for three or four years with remarkable regularity and great success, the coal economy claimed being about 25 per cent. for the same duty previously performed by the paddle steamers. Turbine vessels have also been built, or are now building, for Channel service between Dover and Calais, Newhaven and Dieppe, Dover and Ostend, Stranraer and Larne, Heysham and Belfast and the Isle of Man; a number of yachts have been fitted with turbines, and other vessels for the Australian and New Zealand trade and for the Canadian lake service have been ordered, and the Allan line has ordered two ships, in addition to which the Cunard Company has also ordered one turbine propelled intermediate steamer of moderate speed. But the two new Cunarders, owing to their size and the high rate of speed to be attained, far surpass any of these ships, the capital expenditure involved in each being something like ten times that of any of the vessels enumerated.

The responsibility for determining the type of prime mover and other items in the design was thus a serious one. Of course, the success attained by the many turbine vessels already in service was a factor pointing the way to the courageous designer; but, altogether apart from the much higher cost involved, there was the material difference that most of these other vessels scarcely lose sight of the land, because their trip is so short, while they have not as yet been in operation a sufficiently long time to afford data as to the cost of maintenance and as to their durability. This is in part met by experience with land installation; but the differences between the intensity of stresses on sea and stationary machinery of course affect maintenance very materially.

A commission of experts was appointed to consider the question as to the respective desirability of reciprocating and of turbine engines for these two ships, which are to be built under agreement with the Government for carrying the mails and for service as mercantile cruisers in time of war, at a speed of from 24½ to 25 knots, and which, it may be added, the Government is particularly anxious to have able to compete with the best ships of the American ship "combine." The commission included the Marine Superintendent of the Cunard Company, the Deputy Engineer in Chief of the Navy, the Chief Engineer-Surveyor of Lloyd's, and a member of a well-known shipbuilding firm which has been prominent in installing the Parsons type of turbine engine. Their report is said to review the turbine from every standpoint, and to be the most carefully prepared judicial pronouncement on the subject yet made. It is now estimated that the economy in weight of the turbine engines will only be about 3 per cent., instead of the 10 per cent. at one time thought possible. It is fully believed that there will be a saving in fuel, although there has, of course, been difficulty in arriving at definite data on account of the changed conditions. At low power there is now considered to be no question that the turbine is not so economical as the reciprocating engine, but this disadvantage operates more in the case of naval ships, where the greater part of the steaming is at low power, than it does in the case of the Atlantic liner, which runs for 99 per cent. of her time at full power.

It is understood that four shafts will be fitted in each of the new ships, probably with one propeller and one go-ahead turbine on each. Hitherto, in British turbine ships, three shafts have been installed, but the first turbine-driven war vessel built for the German navy, the "Lübeck," just launched from the Vulcan Works at Stettin, has four shafts, although in this case the decision was doubtless influenced by the question of economy at low power, because for low speed two of the shafts can be run at full speed and the other two need not be used. In the Cunard liners, however, the four shafts are almost a necessity, as it would be inadvisable to transmit the enormous power required through three shafts. While a sea speed of 24½ knots may be gotten with 65,000 h. p., there must be something in reserve to insure regularity in the hour of arrival. There will probably be two distinct steam cycles, the two low-pressure turbines being placed on the two inside shafts, while the high-pressure turbines will be on the outside shafts. The two reversing turbines will also be placed on the inside shafts. It is understood that the intention is to minimize the revolutions of the propellers, as experience has shown that slow running, large surfaced, coarse pitched propellers give the best results. The question of propellers, however, will be the subject of further experiments.

In the way the investigations are being made, Lord Inverclyde and his board are performing a duty not only to the company, but to science generally, and every one will hope that it may carry its full reward in the construction of ships which will not only embody all that is best according to present-day knowledge, but will anticipate many of the probable developments of the near future.

Pacific Type (4-6-2) Locomotive for the Michigan Central.

The locomotive illustrated herewith is heavier and more powerful than any heretofore used in passenger service on the Michigan Central. The builder is the Schenectady Works of the American Locomotive Company, and the order calls for four locomotives which will have the road numbers 267, 268, 498 and 499 respectively. Other engines of the same type and generally similar dimensions are in use on the Boston & Albany and the New York Central, and are giving good service. These new engines are heavier than the 4-6-2 locomotives of the Chicago & Alton, which were described in the *Railroad Gazette*, Nov. 7, 1902. The principal dimensions of the new Michigan Central locomotives, the Chicago & Alton locomotives and the New York Central locomotives are given in the following table:

	M. C.	C. & A.	N. Y. C.
Total weight, lbs.	221,000	219,000	218,000
Weight on drivers, lbs.	140,500	142,000	140,500
Cylinders, inches	22x26	22x28	22x26
Diameter of drivers, inches	75	73	75
Boiler pressure, lbs.	200	220	200
Heating surface, sq. ft.	3,895	4,078	3,758
Length of tube, ft. and in.	20.0	20.0	20.0
Number of tubes	354	330	303
Grate area	50.2	54	50.2
Tractive effort, lbs.	28,500	34,700	28,500

Although the Michigan Central locomotive weighs 2,000 lbs. more than the C. & A. locomotive, the weight on drivers is 1,500 lbs. less. The maximum tractive effort of the Chicago & Alton engine is 6,200 lbs. more than that of the Michigan Central or New York Central locomotives. This greater tractive effort is due to the slightly higher steam pressure, the longer cylinders and the smaller drivers of the C. & A. locomotive. The C. & A. locomotive has 330 2¼-in. tubes, against the 354 2-in. tubes of the M. C. locomotive and the 303 2-in. tubes of the N. Y. C. locomotive. The relative performance of the Michigan Central and the New York Central locomotives will afford an interesting comparison of the value of good circulation between the tubes in a locomotive boiler, as both engines are practically identical except in regard to the number of tubes in the boiler.

The Michigan Central engine has several interesting features. The frames are cast steel with slab rear sections. The frames have no joints except back of the rear drivers. The trailing truck is radial with outside journals and radius bars. The trailing truck swings about a center 75 in. from the center of its axle. A new design of jaw binder is used which dispenses with vertical frame bolts for binders. The pedestal binders are cast steel with 2-in. deep slots. The weight of the binders is carried by 1⅛-in. horizontal bolts.

In order to show the maximum draw-bar pull at different speeds of the new Pacific type and the older Atlantic type locomotives used by the Michigan Central, the diagram, Fig. 1, has been plotted. The formula* used is that suggested by Prof. W. F. M. Goss and takes into account rolling friction, wind resistance, machine friction and boiler capacity. These curves show that at speeds above 25 miles an hour the maximum capacity of the new locomotive is not much greater than that of the Atlantic type locomotive. The new engines, however, should be able to start easier and accelerate quicker than the Atlantic type locomotive.

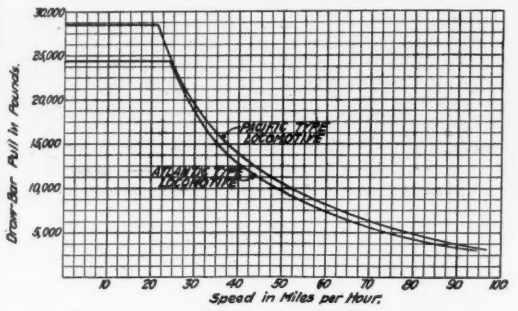
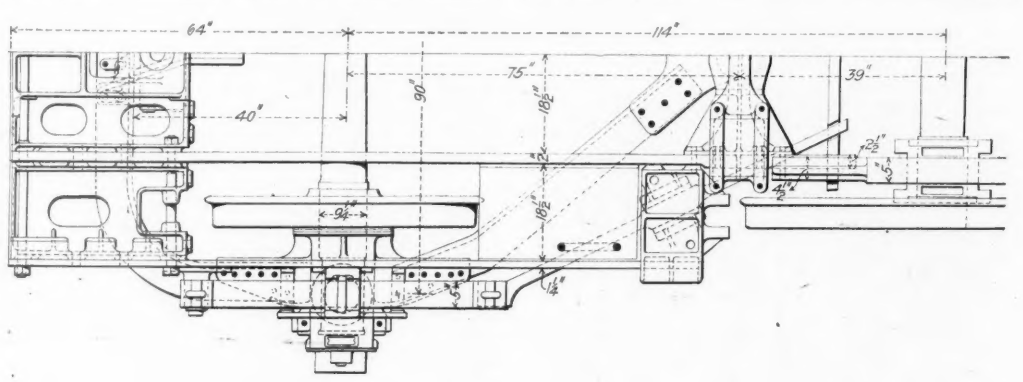


Fig. 1.—Maximum Power of Michigan Central "Pacific" and "Atlantic" Type Locomotives.

A general description follows:

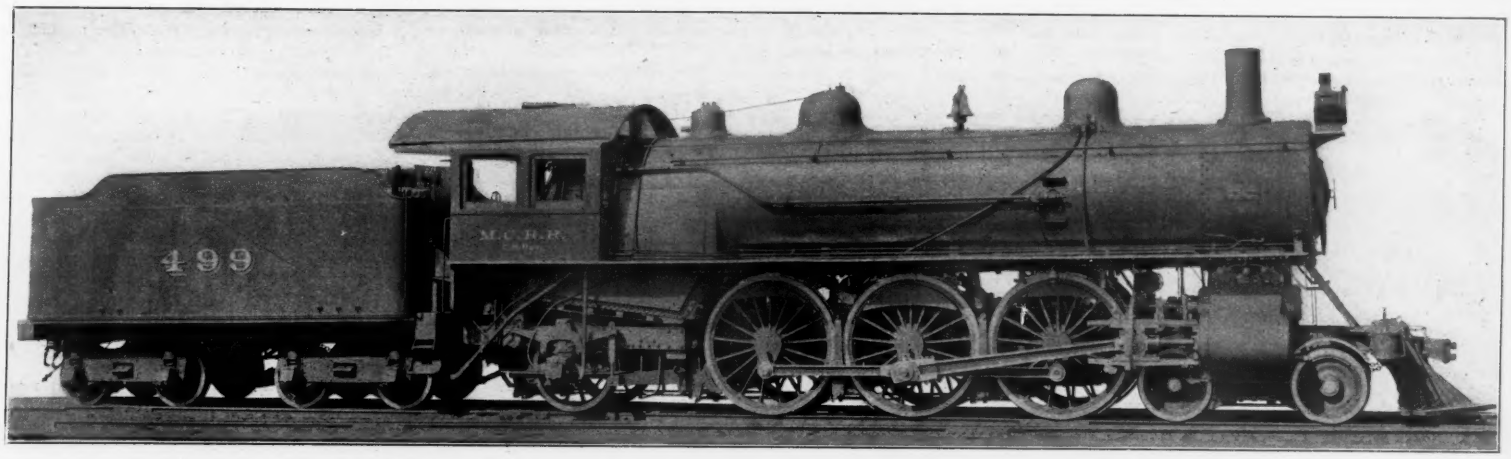
Kind of fuel to be used	Bituminous coal
Weight on drivers	140,500 lbs.
Weight, total	221,000 lbs.
Weight tender loaded	122,600 lbs.
General Dimensions.	
Wheel base, total, of engine	33 ft. 7½ in.
Wheel base, driving	13 ft. 0 in.
Weight base, total (engine and tender)	60 ft. 5 in.
Height of stack above rails	14 ft. 10 1-32 in.
Heating surface, firebox	180.3 sq. ft.
Heating surface, water tubes	23.6
Heating surface, tubes	3,690.6 sq. ft.
Heating surface, total	3,894.5 sq. ft.
Grate area	50.23 sq. ft.
Wheels and Journals.	
Drivers, number	6
Drivers, diameter	75 in.
Drivers, material of centers	Cast steel
Truck wheels, diameter	36 in.

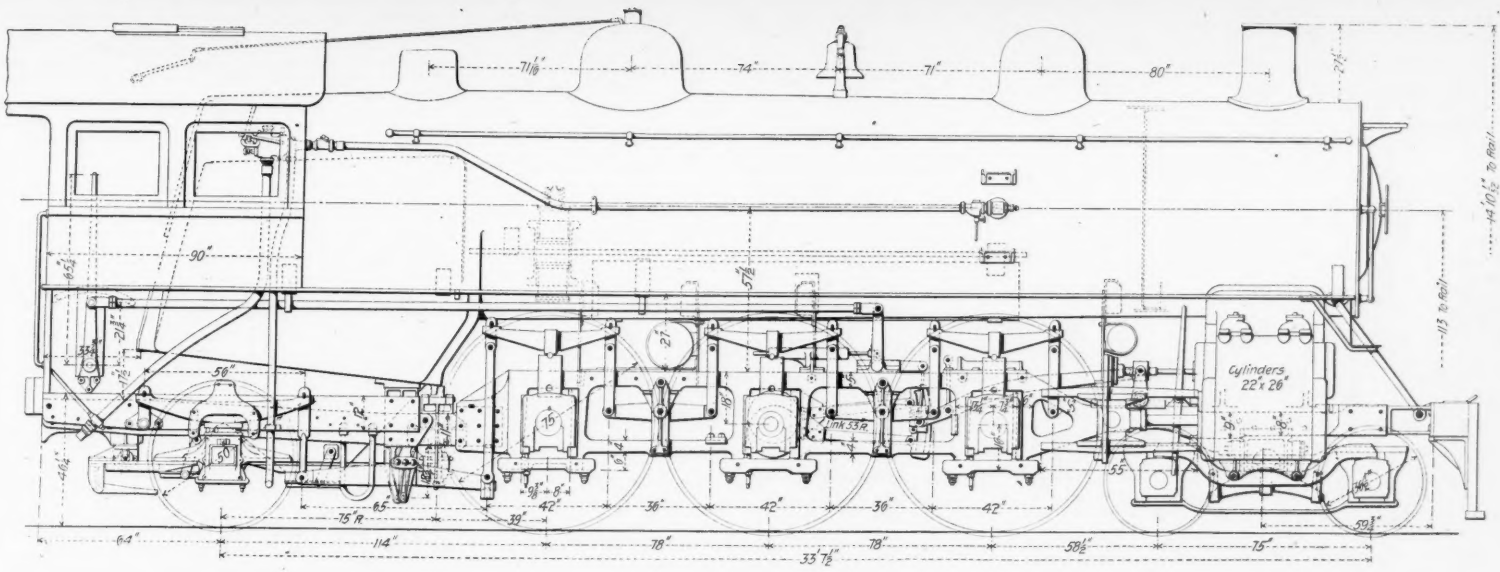


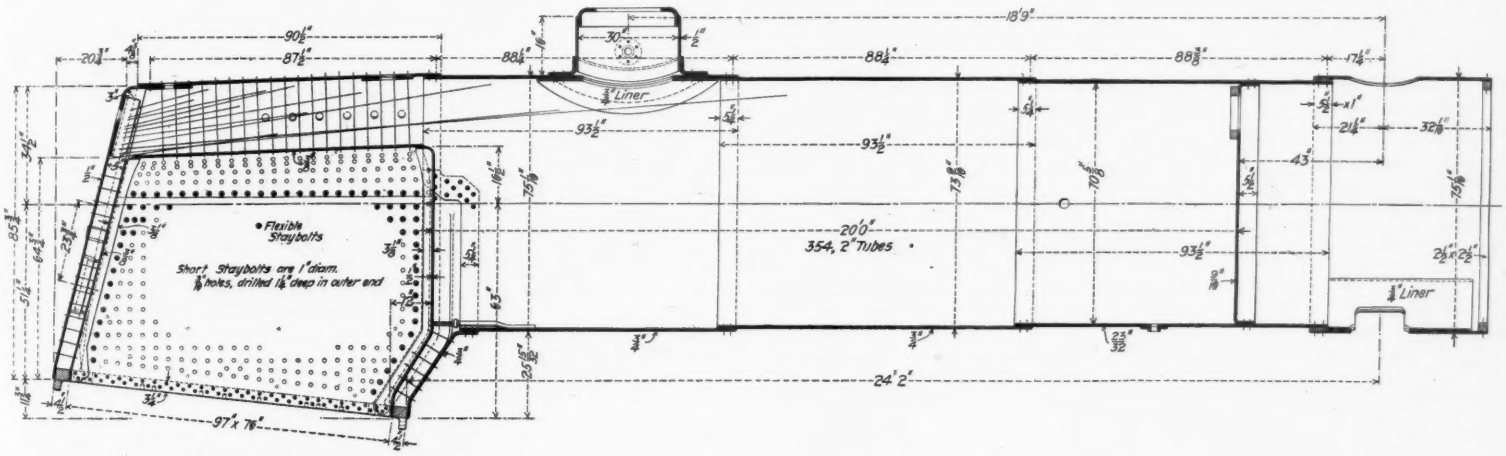
Half Plan of Trailer, Michigan Central Locomotive.

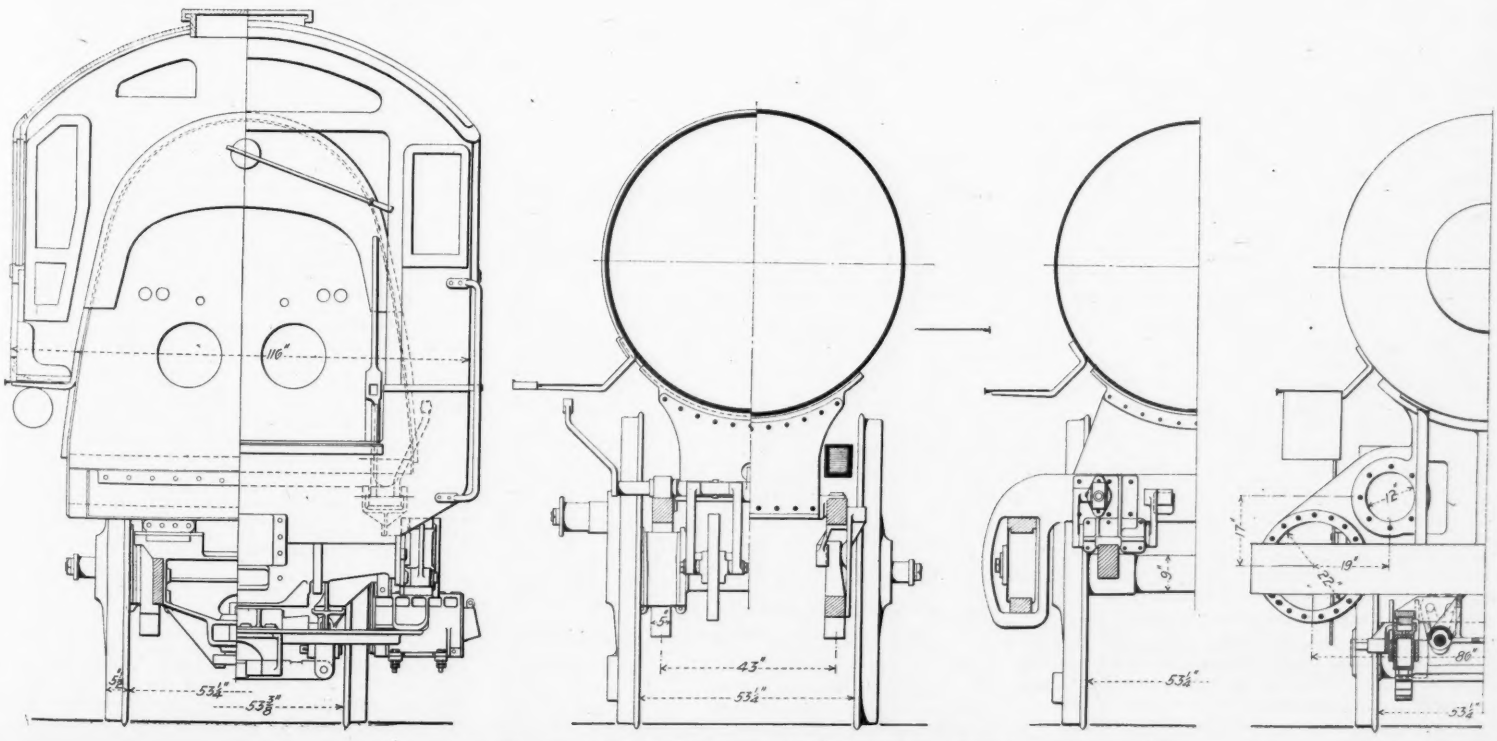
Journals, driving axle, size	9½ in. x 12 in.
Journals, truck axle, size	6 in. x 12 in.
Main crank pin, size	7½ in. x 4¾
Cylinders.	
Cylinders, diameter	22 in.
Piston, stroke	26 in.
Piston rod, diameter	3¾ in.
Kind of piston rod packing	Dunbar
Valves.	
Kind of	Piston
Greatest travel	6 in.
Outside lap	1¼ in. and 1 in.
Inside lap or clearance	¼ in. and ⅛ in.
Lead in full gear	0 in.
Boiler.	
Type of	Straight top
Working steam pressure	200 lbs.
Thickness of material in barrel	23-32 in.
Diameter of barrel	72 1-16 in.
Seams, kind of horizontal	Butt joint, sextuple, riveted
Seams, kind of circumferential	Double
Thickness of tube sheets	½ in.
Thickness of tube sheet	⅝ in.
Crown sheet stayed with	Radial stays
Fire-box.	
Length	96⅛ in.
Width	75¼ in.
Depth front	79½ in.
Depth back	64¾ in.
Material	Carbon steel
Water space, width, front, 4½ in.; sides, 4½ in.; back, 4½ in.	
Grate, kind of	Rockaway, four sections
Tubes.	
Number	354
Material	Charcoal iron
Outside diameter	2 in
Length over sheets	20 ft. 0 in.
Other Parts.	
Exhaust nozzle, single or double	Single

*See *Railroad Gazette*, Jan. 17, 1902.









Pacific Type (4-6-2) Locomotive for the Michigan Central.

Exhaust nozzle, diameter	5⅜ in., 5⅝ in., 5⅞ in.
Stack, straight or taper	Straight
Stack, diameter	18 in.

Tender.

Type	Water bottom
Tank capacity for water	6,000 gal.
Coal capacity	10 tons
Type of under frame	10 in. channels
Type of truck	Fox pressed steel, floating bolster
Diameter of truck wheels	36 in.
Diameter and length of journals	5½ in. x 10 in.

Accident Bulletin No. 10.*

The Interstate Commerce Commission has issued Bulletin No. 10, showing railroad accidents in the United States during the three months ending December 31, 1903. The number of persons killed in train accidents was 446, and of injured 3,178. Accidents of other kinds, including those sustained by employees while at work, and by passengers in getting on or off the cars, etc., bring the total number of casualties up to 14,485 (1,166 killed and 13,319 injured). These reports deal only with (*a*) passengers and (*b*) employees on duty.

Table No. 1—Summary of Casualties to Persons.

	Passengers.		Employees.	
	Killed.	Injured.	Killed.	Injured.
Collisions	73	789	189	1,158
Derailments	74	344	83	443
Miscellaneous train accidents	..	15	27	429
Total train accidents	147	1,148	299	2,030
Coupling or uncoupling	..	..	78	926
While doing other work about trains	..	..	52	2,811
Overhead bridges, etc.	1	7	30	307
Falling from cars or engines, or while getting on or off	21	406	210	2,478
Other causes	6	376	322	2,830
Total not train accidents	28	789	692	9,352
Total all classes	175	1,937	991	11,382

The derailment which is numbered 4 in the double-column table of causes was the worst passenger-train accident, measuring by the number of fatalities, that has occurred in this country for 15 years; and the present record contains six other accidents which caused 106 deaths and 196 injuries, so that this quarter's totals are larger than any before reported. The casualties to passengers in train accidents during the time since the accident law went into effect have been as follows:

Passengers killed and injured in train accidents.

Quarter ending with—	Bulletin number.	Killed.	Injured.
Sept., 1901	1	57	1,237
Dec., 1901	2	51	762
Mar., 1902	3	41	826
June, 1902	4	18	761
Sept., 1902	5	41	1,229
Dec., 1902	6	40	1,097
Mar., 1903	7	52	1,091
June, 1903	8	31	1,007
Sept., 1903	9	60	1,668
Dec., 1903	10	147	1,148

The number killed in the quarter now under review, the last in this list (147), is more than three times the average number killed during the nine preceding quarters, which average is 43 1/9. It appears that only four other train accidents have occurred in this country which have caused as many as 65 deaths each. These four are recorded as follows:

Year.	Locality.	Killed.
1888	Mud Run, Pa.	66
1887	Chatsworth, Ill.	85
1876	Ashtabula, Ohio.	80
1856	Camp Hill, Pa.	66

Of the total in the table below, 287 collisions and 119 derailments affected passenger trains.

Table No. 2—Collisions and derailments.

	Number.	Loss.	Killed.	Injured.
Collisions, rear	489	$469,713	88	522
Collisions, butting	296	527,075	126	771
Collisions, trains separating	287	154,549	10	99
Collisions, miscellaneous	760	340,012	38	555
Total	1,832	$1,491,349	262	1,947
Derailments due to defects of roadway, etc.	199	126,656	10	123
Derailments due to defects of equipment	570	461,520	14	141
Derailments due to negligence	98	98,913	11	137
Derailments due to unforeseen obstruction	66	89,641	79	91
Derailments due to malicious obstruction	26	57,121	6	73
Derailments due to miscellaneous causes	220	201,800	37	227
Total	1,179	$1,035,651	157	787
Total col. and der.	3,011	$2,527,000	419	2,734

The accidents referred to in the paragraph following Table No. 1, in connection with derailment No. 4, are (in the order of the magnitude of their death lists) collisions 6, 16, 1, 8 and 9, and derailment No. 1. These seven accidents constitute the most noticeable factor in making this quarter's lists more disastrous than any thus far recorded. Derailment No. 4 happened to an eastbound passenger train, running at about 40 or 45 miles an hour. It struck an obstruction, consisting of heavy timbers 21 ft. long, derailing the entire train except the two rear cars. The timbers had fallen from a car in a westbound train on the adjacent track by reason of stake ties parting and stakes breaking. The timbers (a full carload) were

*The *Railroad Gazette* accident record for October, November and December will be found on pages 851 and 923 (1903) and 77 (1904).

CAUSES OF THIRTY-TWO PROMINENT TRAIN ACCIDENTS (CLASS A).

[NOTE.—R. stands for rear collision; B., butting collision; M., miscellaneous collisions; D., derailment; P., passenger train; F., freight and miscellaneous trains.]

COLLISIONS.

Number.	Class.	Kind of train.	Killed.	Injured.	Damage to engines, cars and roadway.	Reference to record.	Cause.
1	R	F. and F.	17	35	$975	2	Collision of work trains; laborers in caboose killed; failure of brakeman to stop train by flag; this brakeman (38 years old) was a yardman, but had passed examination for appointment as road flagman.
2	B	F. and F.	0	2	2,100	11	Engineman disregarded meeting order; operator at meeting point had copy of order, but failed to stop train; engineman's experience as such, 9 months; operator's experience, 12 days.
3	M	P.	0	4	5,100	17	Passenger train ran over misplaced switch and collided with cars on side track; switch left wrong by fireman, to whom brakeman had wrongfully delegated the duty; fireman's experience, 9 months; had been on duty 20 hours.
4	B	P. and F.	1	16	5,335	58	Misplaced switch and false signal at interlocking; interlocking had been disconnected for repairs; repairman and 3 signalmen disregarded rule to use hand signals under such circumstances.
5	B	F. and F.	2	1	7,000	10	Engineman slept and ran past train-order signal; on duty 9 hours, 45 minutes, after 3 hours' rest; conductor in caboose, engaged in making report, did not observe signal.
6	R	P. and P.	32	38	7,100	27	Flagman of train standing at station failed to signal approaching train; engineman of latter failed to keep good lookout. Two coaches crushed and destroyed by fire, started presumably by oil lamps.
7	B	F. and F.	2	2	7,700	12	Conductor misread name of station in telegraphic order; engineman (who was killed) is claimed by conductor to have read it in the same way; operator to whom order was read by conductor claims that it was read correctly; order was legibly written; conductor's experience as such, 2 months; engineman's experience on this line, 1 month; flagman's, 3 months; fireman's, 1 month.
8	B	P. and F.	16	25	8,200	5	Collision of extra passenger train with switching train in yard; conductor and engineman of passenger train disregarded rule to run through yard with speed under control.
9	B	F. and F.	16	20	8,464	37	Work train continued to occupy main track after expiration of time specified in despatcher's order.
10	B	F. and F.	0	3	9,200	65	Train became uncontrollable on descending grade; after leaving a car the men in charge had neglected to connect air hose, and power brake was therefore ineffective.
11	B	P. and P.	2	31	10,230	54	Engineman (who was killed) forgot meeting order and ran 3,000 feet beyond meeting station; engineman had neglected to sound the required whistle signal on approaching meeting point, and conductor neglected to apply air-brake, as he should have done when such signal was omitted.
12	B	P. and F.	1	7	10,427	61	Freight train waited on side track for train No. 14, and men in charge slept; another train passed and they assumed that it was No. 14.
13	M	F.	0	2	10,770	18	On descending grade, train broke in two, doing slight damage; both parts of train were stopped by automatic application of brakes, but not enough hand brakes were set to hold the train, the air leaked off, and the cars ran away. (See text).
14	B	F. and F.	1	2	12,000	16	Engineman, who was to meet two trains, met one and forgot about the other; all members of crew blamed for not remonstrating when engineman started from station on the time of the other train.
15	M	F. and F.	3	4	12,080	39	Collision at crossing; rule required both trains to stop before crossing; both disobeyed.
16	B	P. and P.	18	57	15,720	56	Engineman ran past station at which he should have stopped for a despatcher's order; station agent says train-order signal was set to indicate stop; engineman says it indicated all clear; immediately after passage of train (5:30 p. m.) light in signal was found to have been extinguished by wind.
17	R	P. and F.	1	11	17,000	48	Fifteen cars of freight train, left standing on steep grade, ran back into head of following passenger train; cars when left were held by air-brakes on 4 and hand brake on 1 (caboose); conductor's experience, 2 years; damage largely caused by fire started from ruptured gas pipe or tank.
18	B	P. and F.	4	5	18,000	8	Conductor and engineman of freight misread time-table.
19	B	P. and P.	3	6	20,800	3	Conductor and engineman, running 4 hours late, overlooked opposing train.
20	B	P. and F.	1	12	21,400	59	Engineman of freight misread telegraphic order.
21	B	F. and F.	6	5	26,900	34	Mistake of operator in writing order and recklessness of conductor and two enginemen; damage largely due to fire and explosion. (See explanation in text).
Total collisions			126	288	236,501	..	

DERAILMENTS.

1	D	P.	7	21	$21,134	74	Passenger train obliged to take side track, because of delay to freight, entered too fast, flagman of freight having neglected to signal the passenger to reduce speed.
2	D	F.	1	2	4,000	40	Broken wheel; wheel overheated by hand brake being left on too long by brakeman of one year's experience. Of 33 cars in train only 6 had power brakes working.
3	D	F.	1	2	7,000	43	Train became uncontrollable on descending grade (1½ per cent). Of 40 cars in train 30 had power brakes in operation. Rule requires speed to be regulated by hand brakes, but engineman had used air-brakes for this purpose and lacked power to apply brakes to make stop.
4	D	P.	65	4	9,800	73	Track obstructed by timbers which had fallen from an open car, because load was not securely fastened; car inspectors failed to detect defective stakes. (See details in text).
5	D	P.	1	33	10,000	20	Broken journal.
6	D	F.	0	0	13,000	22	Broke through burning trestle bridge; dense fog obstructed view of bridge.
7	D	P.	0	27	15,000	23	Rails maliciously loosened. Criminal was caught, tried and sentenced to life imprisonment.
8	D	P.	1	4	17,500	44	Broke through burning trestle bridge; bridge had been ignited by camp fire made by tramps.
9	D	P.	3	34	18,700	72	Misplaced switch; engineman, running at high speed, disregarded distant and home signals warning him to stop before reaching switch.
10	D	P.	1	7	21,818	26	Failure of Howe truss bridge. Cause of failure reported unknown. Timbers in bridge mostly six years old.
11	D	P.	3	12	43,300	76	Cause unknown; supposed to be defective track. Of the damage $37,300 was due to fire, which started from coal heater in wrecked passenger car.
Total derailments			83	146	$181,252	..	
Total collisions and derailments			209	434	$417,753	..	

loaded at a lumber yard, and the cause of the accident is reported as "carelessness on the part of employees of the lumber yard in not selecting stakes of good quality and size to make the load secure, and failure of car inspectors to detect this defect." The timbers were loaded by the shipper, and the load was inspected by the agent of the railroad company at the shipping station. It was also inspected by two successive conductors, who were in charge of the train which hauled the car to the first division point, and by the car inspector at this division point. This inspector has been in the employ of the company, in the capacity of car inspector, for 16 years. Before the car left this place the load was inspected by the assistant yardmaster, and by the brakeman, who was charged with the duty of putting the car into the train for its trip over the next division; and, finally, by the conductor of this last train. The car was a platform car and the load was 5 ft. 10 in. high. The stakes at the sides, set in pockets of the ordinary pattern, were connected across the top of the load by ties consisting of boards, each board being nailed to the side of a stake on one side of the car, and in the same manner to a stake on the opposite side. The passengers who were killed were nearly all of them scalded by steam which escaped from the dome of the engine, which, as a result of the wreck, was left in such a position as to emit steam into the leading passenger car, which was the smoking car. The passengers in the other cars escaped injury.

In view of the exceptional nature of this accident, it will be of interest to note that in the quarter under review there were five other derailments, which were caused by objects on the track which had fallen from cars, as follows:

		Killed.	Injured.	Loss.
77	Car door	1	4	$2,770
78	Stone	0	1	150
79	Small stone	0	4	1,000
80	Bale of cotton	0	0	325
81	Bridge iron	0	0	600

Collision No. 6, resulting in the death of 32 passengers, was due to negligence on the part of the men in charge of both of the trains involved, combined with fire; the destruction of the two passenger cars of the foremost train by fire, which presumably started from their oil lamps, having been, according to the railroad company's report, a principal element contributing to the large loss of life and large property damage. The foremost train, an accommodation, was standing at a station, and had been so standing two or three minutes. It was behind time, and the following train, an express, was already due. Notwithstanding these facts the flagman did not go back to give a warning signal until after he had assisted the passengers to alight, and he was then able to go only about 200 ft. before the express was upon him. The engineman of the express could have seen the local train's red lights (on the rear car) at a point 2,800 ft. in the rear. Presumably, the flagman's knowledge of this fact affords a partial explanation of his neglect. On the other hand, the omission of the engineman of the express to apply the brakes and reduce the speed of his train appears to be taken by the officers of the road to prove that he was not keeping a good lookout, and therefore did not observe the red light of the standing train as soon as he should have observed it. The flagman of the standing train testifies that the engineman of the express did not give the whistle signal, which should have been sounded as an acknowledgment that he saw the flagman's light. This flagman had been in the service of the company five months. The conductor in charge of this train, who should have seen that the flagman promptly performed his duty, has been in the service 15 years, and his record is reported as good. The engineman of the express has been in the service 26 years, and his record is reported as first class.

Collision No. 16 occurred at a time when a violent storm of wind and snow prevailed. Of the men whose contradictory testimony is noted in the table above, the station agent has been in the service of the company 35 years, the engineman 26 years, and the fireman three years, and all are reported as having clear records. The statements of these men were given not only to the officers of the road but also before a coroner. If the signal was in the "stop" position, the fact that the light had been extinguished afforded no excuse to an engineman for disregarding it, as it would be his duty in such a case to reduce his speed, or, if necessary, to come to a full stop in order to learn the reason why the light was not burning or to be able to see the signal by the light of the locomotive headlight. The agent testified that the same light had been extinguished by the wind before on the same evening, and that the light of another lamp of the same style had also been blown out.

The causes of collisions 1 and 8 are explained in the table as fully as it is possible to explain them from the reports which have been received. The 17 persons killed in the first mentioned were all employees, being laborers on a work train, while the 16 killed in the other were all passengers. The fact that such terrible results may be produced by such simple lapses must be taken to indicate either a grave defect in the methods of managing trains or serious deficiencies in the qualifications of the man or men at fault.

The men responsible for collision No. 9 were the conductor and engineman in charge of the work train. They had been in the service of the company five years; the conductor was 28 years old and the engineman 30. By way of explanation of his error the engineman said that his engine was not working properly, and that in looking for the trouble more time was consumed than he was aware of. The supply of water in the tender had also run low, and he was anxious to reach a water station. In this case, as in No. 1, the victims were all employees on a work train.

Collision No. 21 was the result of an error in a train order. The train despatcher issued an order that train No. 31 would meet train third, No. 52, engine 745, and train No. 34, engine 755, at G. This order was transmitted simultaneously to operators at L and H. The operator at L delivered copies to third No. 52 and No. 34, in proper shape; but the operator at H delivered to No. 31 an order directing that train to meet No. 34 at G, but omitting any mention of train third No. 52. The despatcher and the operator at L state that the operator at H repeated the order back to the despatcher correctly. It is supposed that this operator took the order correctly, but that he wrote it down in bad shape, and that in recopying the order (recopying is contrary to the rule) he omitted train third No. 52. He has had three years' experience as operator, and had been on duty about eight hours when he took this order. The collision would have been avoided if the conductor and the two enginemen of train No. 31 had done their duty. At G they took the siding and were met by train third No. 52, with engine 745. They assumed that this was train No. 34 and that a mistake had been made in the number of the engine shown on their order. Without taking proper steps to ascertain if such was really the case, and in violation of the rule, they started out and met No. 34 at high speed. The two enginemen paid the penalty of their error with their lives. One of them had four years' experience as engineer, the other one and one-half years. The conductor has had 13 years' experience in that capacity.

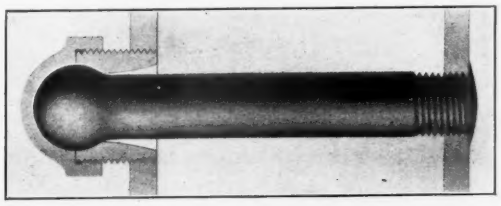
Concerning collision No. 13, the superintendent reports that he did not blame the trainmen. The train consisted of 53 cars, and it was going down a steep grade (2 per cent.) at midnight. It broke in two behind the 11th car. The whole train being air-braked, both portions were automatically stopped (how far apart is not stated). The conductor was the only man at the rear of the train and he went back to flag a following train. The two brakemen were on the front part, and before they could get back to the rear portion and set enough hand brakes to hold it the air leaked off and the 42 cars of the rear part ran forward into the 11 cars of the front part, making a wreck costing $10,770.

It is hardly necessary to observe that the events recorded in this distressing record have been topics of much discussion in the daily press during the months covered by the report; nor should it be necessary to call attention to the fact that the casualties and losses here set forth have an important bearing in connection with the proposition to extend the use of the block system, which was embodied in the 17th annual report of the Commission. Derailment No. 4 has, indeed, no place in a discussion of the block system; but the other derailment (No. 1) and all of the five prominent collisions occurred under circumstances which have been repeated in hundreds of collisions, and these circumstances are the result of defects for which the block system is universally looked upon as the remedy. That is to say, the block system, while not doing away with every element which contributed to the causes of these collisions, does introduce principles of a different character and does promote habits of obedience and precision which have been found to greatly reduce the death and damage record.

The Tate Flexible Stay-Bolt.

It has been estimated that the minimum cost of a stay-bolt is about $1 a year when all items are considered, and that the average life of the rigid bolt in the danger zone is from 10 to 12 months. The flexible bolt shown herewith has been designed so minimize the liability of breaking, and thus decrease the cost of stay-bolt maintenance. The difficulty with many forms of flexible bolts is that scale and corrosion soon form about the head and prevent the bolt from performing its desired functions.

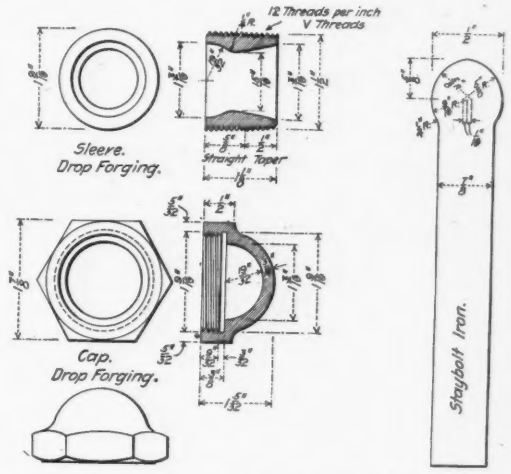
The Tate bolt consists of a bushing or sleeve, a cap



The Tate Flexible Stay-Bolt.

and a bolt with a spherical head. The sleeve is threaded on the outside with a slightly tapering thread at one end, which is screwed into the outer plate—the remaining threads being provided to engage the cap. The sleeve is made with a flaring mouth on the water side, and on the inside of the outer end it is cupped out to form a half-spherical opening which serves as a seat for the spherical head of the bolt. The spherical cap is recessed on the inside and threaded, and when screwed on the sleeve, it completes the ball socket. About 1¼ in. extra material is allowed on the fire-box end of the bolt for screwing in position.

To install the bolt, the outside sheet is first drilled to the size of the sleeve, less a small amount for reaming. The reaming and tapping is done in the usual manner except that it is desirable to connect the two tops by a square socket so that if one top takes hold it will not bulge the other sheet or strip the threads. The threads in the outer sheet should be the diameter of the smaller end of the sleeve and straight. The taper on the sleeve gives a steam tight joint. The cap is screwed into the sleeve with a gasket between the shoulders. The cap and sleeve are then screwed into the sheet. When the sleeve is "home," a sharp jolt on the wrench loosens the cap. The bolt is then inserted through the sleeve and screwed into the fire-box sheet. When the bolt is through the fire-box sheet, a pipe wrench is used to draw it "home." The excess is then cut off, and in peening a spherical "bucking-up" tool is held against the head of



Details of the Tate Flexible Stay-Bolt.

the bolt. This tends to flatten the head, and hence the bolt head is made slightly elongated. The taper on the water side of the sleeve assists in throwing the load off of the threads and onto the sleeve.

This stay-bolt is made by the Flannery Bolt Company, Pittsburg, Pa., and has been in practical use for over five years, in which time it has withstood a very severe test.

The Modern Steam Locomotive.*

In the early development of American railroad systems, locomotives were used which, with few exceptions, were of a single type. As the extent of track increased it was equipped with locomotives of the "American type." It made no difference whether the service was freight or passenger, or whether the locomotives were for use on heavy grades or level track, the fitness of the type was rarely questioned. The extent to which the design was duplicated is disclosed by the fact that in the early 80's a single establishment supplying many different railroad companies and building in one year 600 locomotives, employed but a single man as draftsman.

As a response to early conditions, the type was almost perfect. By the exclusion of other types the problems of the builder were simplified and the cost of manufacture was kept down; and when track mileage was increasing at enormous bounds this was important. As the same patterns were used over and over again every detail was proven in service upon hundreds of locomotives, hence cost of maintenance was low. The design was well adapted to the rough track common in pioneer work and considering the character of the service rendered the type was and still is remarkably efficient as a power plant. But while the type still has an important place in service, few locomotives of its kind are now being built. Its decline is due to the fact that as a type it cannot take on proportions which the modern locomotive must possess. One reason for this is to be found in the fact that it will not admit a grate of sufficient size for present day requirements and another is in its limited tractive power. The grate of the locomotive lies very near the source of its power, and if restricted then the power of the locomotive cannot expand. Originally the fire-box of the American type locomotive was limited in width by the space between the side frames and in length by the distance between the driving axles. In locomotives common in the eighties, the width of the grate was not more than 34 in., and the length generally less than 72 in. Various means have since been employed to increase its size. The spacing between the driving axles was increased in order that the fire-box might be made longer; the boiler was raised to allow the fire-box to rest on top of the frames, instead of between them, allowing the width of the two side frames to be added to the width of the grate, and in some cases the grate was inclined upward and allowed to extend back over the rear driving axle. By means such as these the American type locomotive of '76 came to be the American type locomotive of '93, greatly augmented in proportions and power, but nevertheless defining severe limitations to be met by the designer.

The second limitation affecting the American type concerns its tractive power. Assuming adhesion, or, better, the coefficient of friction between wheel and rail, to be equal to one-fifth of the weight on drivers, the American type engine of the eighties, carrying from 14,000 to 16,000 lbs. upon each driver was capable of exerting a tractive force of from 10,000 to 12,000 lbs. Wheel loads have since so increased that the modern engine may be depended upon to develop a tractive force of 5,000 lbs. per driver.

*A paper read by Prof. W. F. M. Goss before the Am. Soc. M. E., April 26, and illustrated with lantern slides.

or a maximum of 20,000 lbs. for the American type locomotive.

Until harder materials can be had for rails and tires, it is not likely that wheel loads can be further increased, so that greater tractive power must involve more than four-coupled wheels, and therefore a departure from the American type. With these facts in mind it will be of interest to inspect a few modern types and to note the manner in which they have been developed from the original.

Turning to the process which goes on within the fire-box, it will be found that under favorable conditions, each pound of coal burned will sustain one indicated horse power for a period of from 12 to 15 minutes. Within certain limits the power developed is nearly proportional to the amount of coal burned. In the development of the modern locomotive, grates have been enlarged and heating surface extended that larger amounts of fuel may be burned. In one direction only has the designer found the way blocked against his ingenuity. He has not been able materially to augment the strength of the fireman, and, consequently, when running under constant conditions, the power of the modern engine has not increased in proportion to its dimensions. A laborer is working at a fair rate when, in unloading coal from a gondola car, merely dropping it over the side, he handles 6,000 lbs. of coal per hour. At the limit, a locomotive fireman will handle an equal amount, standing on an unsteady platform, placing it upon some particular part of the grate, and usually closing the door after each scoopful. This rate will serve to develop approximately 1,200 indicated horse power, and cannot be exceeded under sustained conditions of running, though for short intervals the rate of power may outrun the rate of firing. Because of the limitations upon the strength of the fireman it is probable that further growth in locomotives will probably await the coming of an automatic stoker which will serve to remove its operation from dependence upon the physical condition of a single man.

The amount that a locomotive will pull at the drawbar depends upon its speed. At slow speed, the maximum pull is limited by adhesion. After the point in the speed is reached for which the adhesion is sufficient to permit the development of the full power, the pull, assuming no loss of power between cylinder and drawbar, is inversely proportional to the speed. For a locomotive capable of developing 1,200 horse power the pull at 25 miles is 22,500 lbs., while at 80 miles the pull is 7,000 lbs. The loss between the cylinder and drawbar, however, which in an actual locomotive must always occur, reduces the maximum actual pull at 80 miles to about 5,000 lbs.

The discussion of grate areas and fire-boxes suggests the question as to whether there are not other forms of boilers than those commonly in service which would serve the locomotive better. The Vanderbilt boiler, having a cylindrical fire-box, is one answer to this question. Again, the extensive adoption of water-tube boilers in stationary and in marine service leads naturally to speculation concerning the application of this type to locomotive practice. Indeed, designs of water-tube locomotive boilers are not wanting, but none are of great promise. Among several that have been proposed is that of Mr. Drummond, of the London & South-Western, the important feature of which is a high flue of large diameter across which water-tubes extend. The boiler of Mr. Drummond, while technically a water-tube boiler, is practically a shell boiler representing an unusual arrangement of tubing. In considering the possible success of any water-tube boiler it will be well to remember that the present locomotive boiler is not much heavier than the best of the water-tube boilers of similar capacity, and the fact that the boiler shell is depended upon to serve as a part of the framework of a locomotive, makes it impracticable to abandon the present shell without greatly increasing the weight of the frames. The side frames are tied to the boiler at frequent intervals, and such important details as guide yokes are in many cases as much dependent upon the boilers for their support as upon the frames. All this increases the difficulty in applying a water-tube boiler to a locomotive.

Closely identified with problems of boiler design is that of front-end arrangement. The front-end, which includes the extending shell of the boiler forming the smoke-box, and in general all mechanism therein contained, such as steam and exhaust pipes, nettings, diaphragms, draft pipes and also the stack. The office of the front-end is to draw atmospheric air into the ash-pan, thence through the gate and fire; to draw the furnace gases through the tubes of the boiler, thence under the diaphragm and into the stack, and to force them out into the atmosphere. In order that this movement may take place a pressure less than that of the atmosphere is maintained in the smoke-box so that when the locomotive is working there is a constant flow from the atmosphere along the course named and back to the atmosphere again. The difference in pressure between the atmosphere and the smoke-box is spoken of as the draft, and under normal conditions of running is usually represented by from 4 in. to 6 in. of water. The draft thus expressed, however, is approximately three times greater than that to which the fire is actually subjected. Thus, a third of the total draft is required to overcome the resistance of the ash-pan and grate, together with the fire thereon. Another third is required to overcome the resistance of the tubes, and another third to overcome the resistance of the diaphragm. These facts serve to explain several things which ordinarily are not well understood.

In the design of the front-end, practice has wabbled badly. The front-end was first short, surmounted by a diamond stack, containing the netting. It was then extended to constitute a cinder trap. It was afterwards discovered that the front-end as a cinder trap was unnecessary and undesirable, and it is now in the process of being shortened again that it may not hold cinders, but may become entirely self-cleaning. While this portion of the locomotive has been the subject of a considerable amount of patient study and while great progress has been made, much yet remains to be done before the whole problem of the front-end is completely solved.

Passing, now, from boiler to machinery, mention must be made of the recent and very general substitution of steel for iron in all cast parts. Such castings as wheel centers, axle boxes and rocker boxes, which were formerly of iron, are now cast in steel, with the result that the engine machinery has been lightened and weight thus saved has been added to the boiler. The form of each individual part of the machine has been carefully studied with reference to the service it is to perform. For example, in an attempt to diminish wear and to reduce the chance of failure in valve gear, the width of links and the length of rocker and saddle pins have been made to occupy the full width between the frames of the engine. Piston valves, with their superior balance, have largely superseded flat valves. By the use of wheels of larger diameter and reciprocating parts of better design, the problem of counterbalancing driver wheels has been so simplified that extremely bad work in counterbalancing is now rarely found, except, perchance, representing combinations which are patented. I am often asked why it is that so much difference exists in the valve gears of American and foreign locomotives. First of all, it is but proper to note that whenever a practice becomes settled there is somewhere a reason for it. The Stephenson link motion has generally been used in this country because it is a good device, and because it is easily worked into the general lines of the American locomotive. In English practice, where inside cylinders are common, that portion of the main axle which lies within the frame is largely occupied by the cranks. There is no room for four eccentrics and consequently the Joy gear, which takes its motion from the connecting rod, is much used. This gear seems on the whole admirably adapted to the condition described, though English designers complain that by its use the motion of the valve is considerably disturbed by a low joint or other irregularity in the grade of the track. Other gears are used in England, though none, perhaps, to the same extent or with as good reason as the one referred to. The Germans make very general use of the Walschaert gear, which takes its motion from a single eccentric and the cross-head of the engine, while the French designer may choose any of the types mentioned, or if occasion seems to demand, may produce an original gear. The choice of a gear is in most cases doubtless made from practical considerations rather than from theoretical. In working out the general lines of the design of a locomotive one or another form adapts itself to the purpose better than others. Of course, this is not true in all cases, but assuming the choice of gear to be controlled by proper limits, it might be so, for it is not a difficult thing to secure a distribution of steam within a locomotive cylinder which will give results approaching maximum performance. A chief requisite in any valve gear is a degree of stiffness and an absence of lost motion which will make the movement of the valve positive. These qualities are especially necessary in the gear of a locomotive, for in this type of engine the port opening at running cut-off is frequently not over a quarter or three-eighths of an inch, so that even a slight defect in any of the mechanism between eccentrics and valve produces large proportional effects upon the time and extent of the port opening. Ten years ago light and poorly designed gear were common defects in the American locomotive. Then it sometimes happened that the steam distribution depended quite as much upon the oil can as upon the position of the reverse lever, and reports are current of an engine which would run well under a partially open throttle, but would stop if the throttle were fully opened, the mechanism being insufficient to move the valve when the pressure was heavy upon it. But the valve gear of the modern locomotive is not of this sort. With its heavy and direct connection, its double suspended link, and with the light weight of the valve to be moved, a marvelously good steam distribution is secured even at the highest speeds. Those who, seeing but one side of the really complicated problem, believe that locomotive valve gears ought to be revolutionized, should investigate carefully before they proceed. They should remember that the modern locomotive under ordinary conditions of running rarely requires more than 32 lbs. of steam per i. h. p., while under favorable conditions it requires less than 25 lbs. Few simple stationary engines exhausting into the atmosphere with their more complex forms of valve gears are doing better than this, which is evidence of the narrowness of the margin limiting possible improvements in this direction.

(To be Continued.)

Machine Tool Builders' Convention.

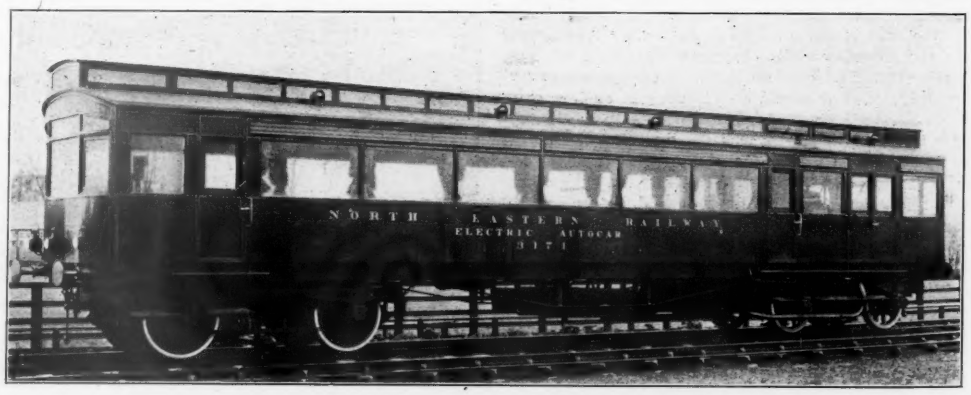
The semi-annual convention of the National Machine Tool Builders' Association was held at Cincinnati, Ohio, on Tuesday, April 26. The officers of the association are: President, William Lodge, Cincinnati; First Vice-President, W. P. Davis, Rochester, N. Y.; Second Vice-President, F. E. Reed, Worcester, Mass.; Treasurer, Enoch Earle, Worcester, Mass.; Secretary, P. E. Montanus, Springfield, Ohio. Forty-one machine tool builders are represented in the association, three new members having been elected. The association passed a resolution re-affirming the resolution adopted at the last meeting, at New York, which bound the members to maintain the present schedule of prices. Papers were read by P. E. Montanus, of the Springfield Machine Tool Company; by F. L. Eberhardt, of Gould & Eberhardt, and by A. H. Tuechter, of the Cincinnati Machine Tool Company. Mr. Montanus pointed out the good work that the association had done in maintaining prices during the present depression in the trade. He called attention to the fact that prior to the formation of the association the net profits on the average line of machine tools went down to a point where it was no longer profitable to the builders to make them. This was not only due to competition, but also to the increase in wages and cost of raw material, in addition to which it became necessary to redesign many types of machines. Weights had been increased and many improvements had been added, such as gear guards, micrometer indexes, etc. The engine lathe had increased from 25 to 40 per cent. in weight, as had also planes, milling machines, etc. He did not believe it possible or advisable for the machine tool builders ever to form a trust, but thought that they should be united harmoniously in order to aid in advancing security and safety in business operations.

The association was formed in 1902, and succeeded in restoring normal prices in some lines, in eliminating certain defects in the prices of detailed parts, and in bringing about a better feeling of confidence. Mr. Montanus went into an elaborate argument in which he gave detailed figures to show the value of the association; as, for example, in 1903, when prices were advanced from 5 to 10 per cent. and demoralization of the business was averted. He made a plea for a larger membership, and hoped to see every reputable machine tool builder in the United States enrolled as a member.

Mr. A. H. Tuechter spoke about the condition of the upright drill trade. He said that during the recent depression nearly every dealer and user asked for lower prices, but that such prices were refused. He cited a number of cases to show what could be done if the builders would stand firm. He thought that the drill makers were not making any money, and had only themselves to blame for this condition. As a remedy it seemed to him that they should organize and fix prices.

Electric Auto Cars—North Eastern Railway.

The electric auto cars on the North Eastern, England, deriving their power from a petrol motor on the car, have run satisfactorily on their trials. The car is the ordinary saloon type, with four-wheel trucks, with clerestory roof, and is 52 ft. over headstocks, with an inside width of 7 ft. 11 in. It is divided into three compartments. The forward end contains the petrol motor and generator, and between this and the center (or passenger portion) is a gangway to permit entrance to either the engine or passenger compartments. The rear compartment contains the machinery for operating the car from that end. The seats are reversible and are arranged in two rows. They are upholstered in the company's usual style. The seating capacity is 52 passengers. The aisle is in the center, between the two rows of seats, and the floor is covered with linoleum. The windows are fitted with curtains, and the lighting is by means of 24

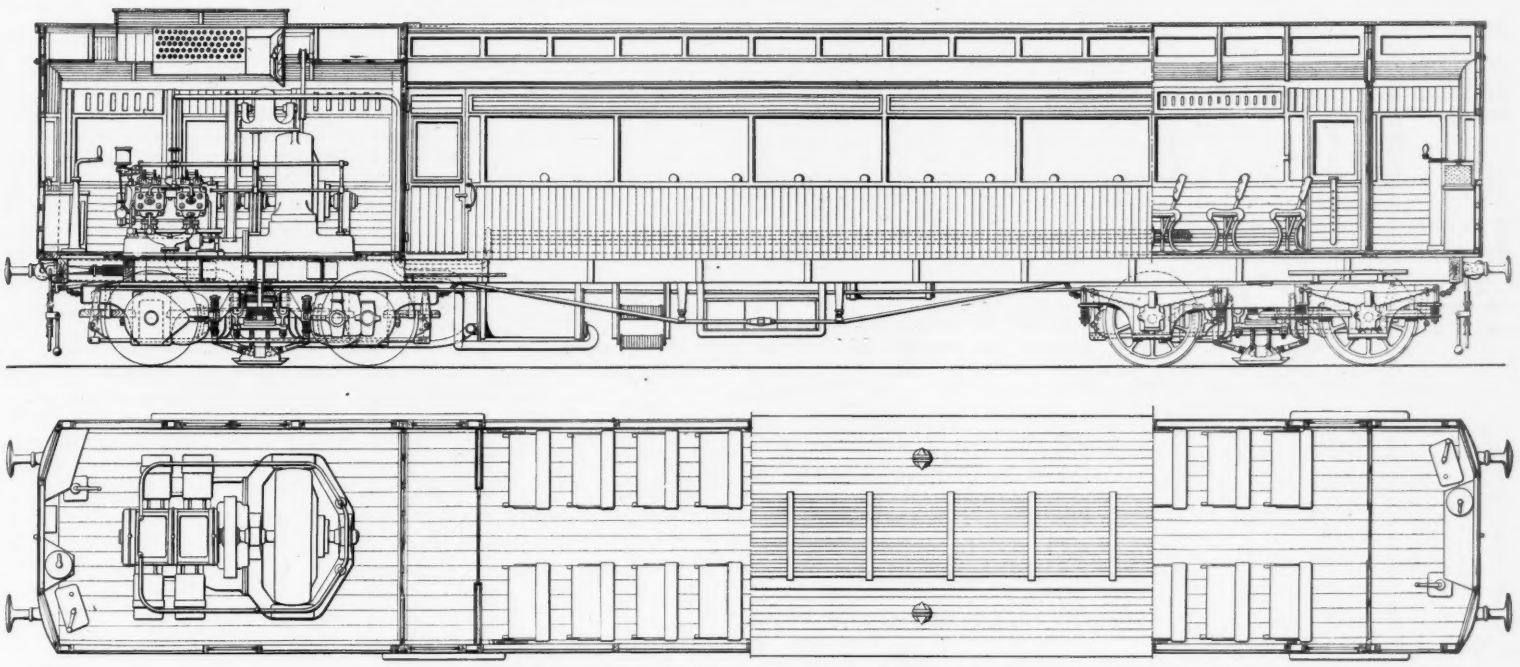


Electric Auto Car for the North Eastern, England.

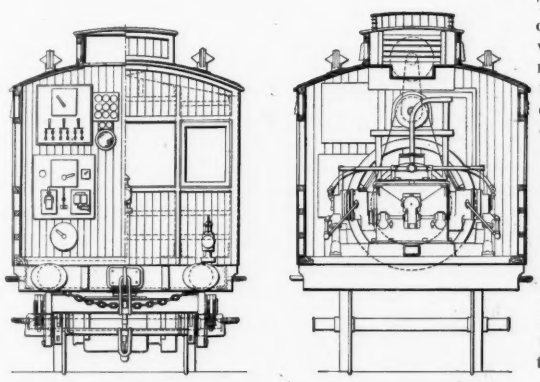
16-c. p. incandescent lamps, current for which is supplied from accumulators carried under the center of the car. The car is fitted with the usual buffers, coupling hooks, and chains, and can run in trains with ordinary rolling stock. The head and rear lights are electric. The car is heated for winter service by electric radiators.

The engine compartment is 13 ft. 3 in. long and contains a 80 b. h. p. 4-cylinder horizontal petrol motor, built by the Wolseley Tool & Motor Car Company, Adderley Park, Birmingham. The cylinders are 8½ in. in diameter by 10 in. stroke, and the normal speed is 420 r.p.m., which can be increased to 480 r.p.m. for starting the car quickly. The cylinders are overhung on a stiffly constructed cast-iron crank chamber, the inspection covers being on the top, and the oil trough beneath. Forced lubrication is used for all the main bearings. The flywheel, which is perfectly balanced, is 3 ft. in diameter. All the valves are mechanically operated by cams on the two camshafts, and these shafts are driven by means of spiral gearing and layshafts from the crank shaft. The crank shaft is two-throw, and of Vickers-Maxim cast steel. The engine cylinders and valve boxes are water-cooled, a Clarkson radiator and Blackman fan being employed for the cooling of the water. The engine is governed at the throttle and in addition auxiliary hand throttling is fitted so that the operator can accelerate the engine speed from either end of the car. The ignition is by means of the usual high-tension system.

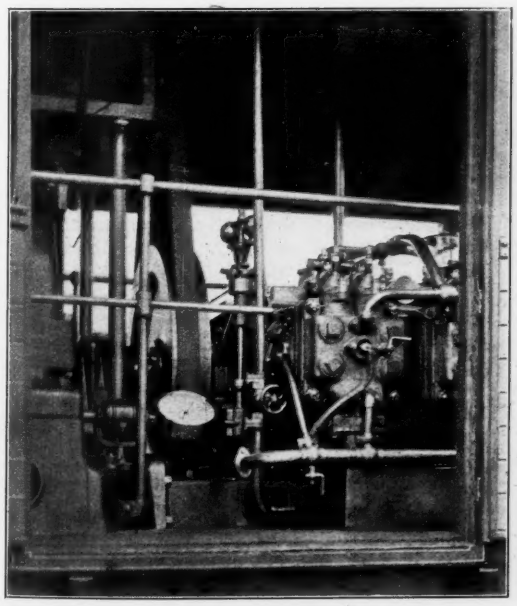
The motor is direct-coupled to the direct-current generator, which is separately excited and compound wound.



Plan and Elevation Electric Auto Car, North Eastern Railway.



Sectional Views, North Eastern Auto Car.



View of Engine, North Eastern Auto Car.

Interior of Car, Looking Towards Engine Room.

The generator is an engine-type machine of 55 k.w. capacity, specially designed for operating over a range of voltage from 300 to 550. This machine operates at a normal speed of 420 r.p.m. and is supported on an extended bedplate; the armature being pressed on to the extended engine shaft, which is provided with a flanged coupling between the generator and oil motor. The field of the generator is split horizontally so that the upper half may be removed through an opening in the roof of the car fitted with a removable cover, for inspecting the armature or field coils. The exciter is a 3.75 k.w. standard 72-volt shunt-wound belt-driven multipolar generator mounted above the main generator and belted to a pulley on the extended shaft. It is capable of exciting the main generator and of supplying current for lighting 30 incandescent lamps, 72 volt, 16 c. p. The voltage of this machine may be increased to 95 volts for charging the battery when not required for lighting.

Two Westinghouse No. 56-55 h. p. standard railway motors with single reduction gears, ratio 18 to 64 are mounted on the front truck by means of a nose suspension bar, with spring, attached to the truck frame. These motors are series wound and are the standard type usually employed for operating heavy high-speed cars. The controllers are the standard series-parallel railway type arranged for electric braking. Resistances are provided in connection with the controllers for gradually increasing the voltage of the motors in starting the trains and for graduating the electric brake in stopping. These resistances are mounted beneath the car. The storage battery consists of 38 cells in ebonite jars, assembled in a wooden box suspended beneath the car. Each battery has a capacity of 120 ampere hours.

The electric brake equipment consists of two electromagnets suspended between the wheels of each truck and immediately above the track rail. It is so constructed that the magnetic circuit is completed through the track rail so that when the coils are energized the magnet is attracted to the rail, thus causing friction between the magnet and the rail and retarding the motion of the car. This retarding action brings pressure to bear upon the brake-shoe applied to the wheel, which further retards the motion of the car, and this friction of the magnet on the track and the brake-shoes on the wheels is sufficient to bring the car to a stop in an extremely short distance. The brake coils are energized by the current from the motors operating as generators and this action further absorbs energy and adds to the braking power. This feature also renders the brake perfectly reliable, as it does not depend upon the generator plant for the supply of power.

An air compressor is on the rear truck and supplies air for blowing an alarm whistle. The compressor is driven by a 1-h. p. electric motor and is started and stopped by means of pressure-controlling switches and cut-outs, thus automatically maintaining a constant pressure in the air reservoir which supplies the whistle. The electric equipment was supplied by the British Westinghouse Electric & Manufacturing Company, Limited, of Old Trafford, Manchester.

The system of working is as follows: The current passes from the generator through an automatic circuit-breaker to the two controllers, and the voltage of the generator is adjusted by means of a rheostat in the field circuit placed near the controller at each end of the car. The generator is used as a motor, supplied with current from the storage battery, for starting up the petrol motor. After having brought the engine and generator up to speed and after the pressure has been adjusted to 400 volts, the car is started in the usual way by manipulating the handle of the series parallel controller to series point for slow speed and to the multiple point for high speed. Afterwards the voltage of the generator is gradually increased to 550 by manipulating the field rheostat near the controller. At this pressure the car will accelerate until a constant speed of 36 miles an hour is attained. In stopping the car the controller handle is moved back to the "off" position and then in a reverse direction over the braking points, thus applying the magnetic track brake. As soon as the car is brought to a standstill the generator field rheostat is readjusted to give 400 volts and it is then in a position for again starting. If it is desired to operate the car at half speed the voltage may be raised to 550 volts by adjustment of the rheostat with the controller handle at the full series point. From this it will be seen that a range of speed is obtainable by variation in the voltage of the generator at two points, viz., approximately half speed and at full speed.

These cars can be put into service at 10 minutes' notice, and they carry a supply of fuel and water for a full day's work. They can be operated from either end. The weight of the car in full working order is 35 tons.

RAILROAD GAZETTE

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CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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The paper by Mr. H. H. Vaughan on the value of heating surface, which was printed last week, deals with one of the most important questions of locomotive design. As frequently noted in these columns, the development of the locomotive in recent years has been concerned chiefly with the development of the boiler. The changes in boiler design have been made for the purpose of increasing the steaming capacity so that heavier trains could be hauled at higher speeds. In general, the heating surface has been increased by lengthening the tubes and putting more of them in the boiler. The quantity of water evaporated per pound of coal burned is increased by lengthening the tubes in a boiler, but no reliable data exists on which to base exact calculations. It is usual to base the evaporative power on the number of square feet of heating surface, but this method makes no allowance for the several factors which affect the steaming capacity. Two boilers may each contain the same quantity of heating surface, yet one may be a much better "steamer" than the other. The value of a square foot of heating surface 20 ft. from the fire-box is certainly much less than the value of a square foot in the fire-box and tests similar to those cited by Mr. Vaughan in his paper, made under modern conditions of practice, would do much towards placing boiler design on a more exact and scientific basis.

A Record-Breaking Death List.

The tenth accident bulletin of the Interstate Commerce Commission, which is for the three months ending with December last, and which marks the end of 2½ years of Government records, brings the unpleasant information that more persons were killed in that quarter than in any other yet reported; and the number of passengers killed in train accidents, 147, was more than three times the average total for the preceding nine quarters. An examination of the *Railroad Gazette* records, which have been kept since 1873, and which have shown passengers in a separate class since 1887, shows no record of passengers killed which approaches the present one, the largest annual total being that of 1887, when 207 passengers were killed in train accidents. This is exactly equal to the total for one-half of 1903 (July-December). The number of employees killed, and the number killed in coupling accidents, also show marked increases in the quarter now under review. The principal accidents in the quarter have, indeed, been published in the *Railroad Gazette* already, and the Government report is not to be looked upon as news except in the totals which it gives and in the authoritative and detailed statements of causes of the worst collisions and derailments; but the news in these merits attention.

In each month in this quarter there were two or more notable accidents, as shown in the table below, compiled from the *Railroad Gazette* records. We have appended the identifying number from the Government table of causes. In the case of the Kentwood collision, the Government record shows 32 killed, where our record showed only 19; but the circumstances are given in such detail that there can be no mistake in our identification of the item:

Principal train accidents, fourth quarter of 1903.

	Killed.	Injured.	No.
Oct. 17—Lambertville, N. J., collision	17	35	1
Oct. 31—Indianapolis, Ind, collision	16	25	8
Nov. 14—Kentwood, La, collision	32	38	6
Nov. 19—Tremont, Ill., collision	16	20	9
Dec. 21—Godfrey, Kan., derailment	7	21	1
Dec. 23—Laurel Run, Pa., derailment	65	4	4
Dec. 26—East Paris, Mich, collision	18	57	16

The bulletin does not add a great deal to our knowledge of the causes of these accidents, but furnishes interesting details. In the collisions at Lambertville and Kentwood, and also in those numbered 2, 3 and 7 in the list of causes we have to note that the culpable employees (or some of them in each case), had had very limited experience, a fact which conveys its own lesson. Collision No. 21 is explained in the bulletin at considerable length in a paragraph which will give train despatchers some points for discussion.

The clauses concerning the Indianapolis collision seem to indicate that the Commission attaches little weight to the findings of the Coroner in that case, which were to the effect that the regulations prescribed by the company were loose and were imperfectly enforced. At any rate, no mention is made of the coroner's report. The Commission's comment appears to mean that if the men who failed to keep the speed of that passenger under control were what would be classed as well-qualified trainmen, then the rules concerning the right to the road in that yard are gravely defective.

The explanation of the East Paris collision hinges on a question of veracity. Railroad officers who read the present report and, with it, consider the circumstances reported in the *Railroad Gazette* (January 29 and March 4) will, we think, be able to reach a conclusion without much difficulty. A case like this illustrates the imperfection of the Government's reports; though it is to be borne in mind that the English Government, with its Inspectors clothed with all needful power, often has to report itself unable to decide which of two men tells the truth about a collision.

The Laurel Run disaster, the worst since Chatsworth and Mud Run, occurred in spite of the inspections of seven men between the point of shipment and the place where the timbers fell off the platform car; though no details are given of the weight of the load or the size or material of the stakes and ties which should have held it. The report of the railroad company indicates that the stakes were not large enough, and that they were not of sound lumber; but nothing is said as to how large they ought to have been, or whether any part of the fault was developed or may have been developed after the car had traversed a part of its route. What should be the size and the number of stakes on a car to hold a load of lumber 5 ft. 10 in. high? This point is not touched upon in the report. The Commission, having no authority in the accident law to hold inquiries into accidents, evidently accepts the railroad company's decision in the matter. The query naturally arises whether, in the rapid increase of the size of loads, since car frames have been made stronger than formerly, the yardmen and trainmen who are responsible for the safety of loading have kept their knowledge "up-to-date." The Master Car Builders' rules for loading lumber on open cars are, doubtless, as full and explicit as they can be made for general use; but they leave some points to the judgment of the inspector, and inspectors often use their own judgment, no doubt, when, to secure perfect safety, they ought to refer to the rule. Many "inspections" are too superficial to be dignified by that name. In other features of railroad work the failure of some one to adapt his work or his vigilance to the new requirements introduced by larger cars or engines has caused serious accidents, and it would not be surprising if the explanation of the Laurel Run case were of the same nature. The training of yardmen and trainmen to know what is a sufficient fastening for a load on an open car and to detect the loosening or breakage of stakes, pockets, boards, cleats, ties and wires before they do harm—is, obviously, a matter requiring much time and care; and the reported remark of a Baltimore & Ohio superintendent, that the annoyance of insecure loads is at present a serious one, suggests that it deserves attention.

An Aftermath of the Merger Decision.

The parties directly interested in the merger case have developed a lively controversy over the effect of the decision of the court in the distribution of the assets of the Northern Securities Company. The Government, having wrecked the combination, cares little for the distribution of the ruins, except to see that they do not become another combination in restraint of interstate commerce. How the status quo may be restored is a question of some moment to the parties in the suit. But what is of greater concern to outsiders is the effect of the decision upon other combinations of long standing, and the extent to which the Government may proceed against them. From a political standpoint, it would be quite unwise for the party in power to prejudice its prestige on the eve of a presidential election, by making new enemies or antagonizing powerful interests in combination, lawful or unlawful. The attorney general seemed to realize this when he announced a day or so after the merger decision that the Government was not going "to run amuck." We may, therefore, infer that nothing sensational will occur before the fall elections. But after that, what then? We do not think it likely that new combinations of the Northern Securities kind will soon follow in the wake of that scheme. The Government will not probably be called upon shortly to decide whether it will prosecute another young Lochinvar out of the West or out of the East. It may sooner or later, however, have to decide upon its procedure in the case of those ancient sinners against the Anti-Trust Law, whose turn will come next to be considered. And these cases, it must be confessed, require deliberate consideration and after that, careful handling. The Government will have to consider first whether these earlier consolidations really come under the ban of the merger decision, and, finding that they do, whether they ought to be treated just as that scheme was. Here is presented a question of law, complicated by a question of policy. Assuming that consolidations of competing lines, occurring long before the merger scheme, are combinations in restraint of commerce between the States, it by no means follows that the Government will treat them as it did the Northern Securities. Theoretically, of course, it ought so to do. On principle the Executive Department ought to enforce the law, come what will. But practically, Governments are not run on that basis. It is not so much a question of principle, as of popularity. What public opinion approves may not indeed always be done. But what it certainly and unmistakably condemns will surely, in this country at least, be left undone. No law can be enforced in the face of public detestation. It has often been tried, but in vain. As things go in politics the present administration has made a record against the trusts and monopolies that ought to answer the purpose for the present; beyond this it is not necessary to go unless public opinion requires it. The natural policy now is to wait and see how the cat will jump. In the meantime we may hazard a guess or two as to what the Government may do if an irresistible force impels action.

The anti-trust law was passed in 1890. Consolidations of competing lines had been formed prior to that year, and a number have been formed since. Thus, the Pennsylvania Company was chartered by the Legislature of Pennsylvania in 1870 for the purpose of managing, in the interest of the Pennsylvania Railroad Company, the railroads west of Pittsburg controlled by that company. The Pittsburg, Ft. Wayne & Chicago Railroad leased by the Pennsylvania Company, runs from Pittsburg to Chicago. It competes with the P. C. C. & St. L., which is also controlled by the Pennsylvania Company by ownership of a majority of stock. Again, the West Shore was leased for 475 years from January 1, 1886, to the New York Central, its competitor. In 1881 the Missouri Pacific acquired a majority of the capital stock of the Iron Mountain. The Missouri Pacific and the St. Louis South Western, a line which competes with the Iron Mountain, are alike owned and operated by the Gould interests.

Are all these several instances of "Contracts, conspiracies, or combinations" in restraint of interstate commerce? As they severally yoke together interstate competing lines, they come within the evil prohibited, as found by the Court. And that is, that they have the promise and potency, if not the actual effect, of suppressing competition in traffic between the States. This is not an accidental, remote and unintentional result, but rather the essence and object of each combination, its irresistible and inevitable tendency. But what effect should be given to the fact that these consolidations were made before the anti-trust law was passed? The punitive provisions

of the law could not, we think, have any operation upon offences committed prior to its passage. But the prohibitive and remedial provisions, authorizing civil proceedings to stop monopolies and unfetter trade, seem to be constitutional in their application to such antecedent consolidations. The effect here, is not, in a legal sense, ex post facto, but rather an application of the law to a continuing evil, within the purview of the statute. Suppression of competition in the eye of the law is an offense committed afresh each day of its existence. The statute acts upon it, not for what it was, but for what it is. If this were not so, we may conceive of competition so stifled, as to prohibit trade to all but a favored few, without any relief whatever by Governmental interference, simply because the stifling process has begun before the law was passed. It would seem, therefore, that so far as the civil remedies given by the statute are concerned, such as the power to issue an injunction and pass judgment upon violations of the law, it is immaterial whether the evils prohibited originate under arrangements made before or after the passage of the law. If it be once ascertained that suppression of competition exists, the Court under the statute is authorized to prohibit it forthwith without reference to the age of the culprit. While these conclusions seem to be unavoidable from the decision in the merger case, and others preceding, it does not follow that the law will at all hazards and without distinction be applied. We can well imagine some instances of restraint in competition so mild, so unobtrusive, so beneficent, as to conciliate, rather than offend, public opinion. There are some communities in the country so enlightened as to realize that competition is sometimes as beneficial as at other times harmful. When such conditions prevail, consolidations really under the ban of the merger decision, have probably nothing to fear. Public opinion here does not require and will not tolerate the enforcement of the letter of the law. And the Government does not move in such cases, because there is no call and, substantially, no cause, to do so, the letter of the law to the contrary notwithstanding.

So the consolidations effected since 1890—the "good trusts," at least in the territory of their friends—need have no great apprehension of prosecution if they lie low and deal justly. As illustrating the force and weight that the opinion of the vicinage has with the Government on the question of enforcing the law, we may take the New Haven road. In 1892 that company leased for 99 years the Housatonic, running from Bridgeport, Conn., to the Connecticut State line, itself lessee of three small roads making through connection to Pittsfield, Mass. In 1893, the New Haven leased for 99 years the Old Colony, with lines from Boston to Newport, R. I., and other interstate and within state lines. In 1895 the New Haven also acquired by stock ownership the New England Railroad, with lines from Boston to Hopewell Junction, N. Y., from Willimantic, Conn., to Providence, R. I., from E. Hartford, Conn., to Springfield, Mass., etc. In February, 1904, less than a year after the Special Circuit Court had assembled to pass judgment upon the Northern Securities, the New Haven announced, as with a blast of defiance, that it had purchased a majority of the stock of the Central New England, which runs from Hartford, Conn., and Springfield, Mass., to Campbell Hall, N. Y. As thus constituted, the New Haven represents several "contracts, combinations or conspiracies in restraint of interstate commerce" within the meaning of the law as construed by the Supreme Court. For upon each occasion of consolidation mentioned, a union of competing interstate lines was effected, for the purpose of dispensing with competition and fixing rates at a profitable figure, a commendable object from a business standpoint, but damnable under the law. While all this has been going on, the people of the States, most deeply concerned, have kicked up no dust, but on the contrary, have quietly accepted, not to say enjoyed, the changes. Public opinion, if not with the New Haven, has at least not been against it. And thus fortified, this inveterate violator of the Sherman law has been boldly rushing its trains by Oyster Bay, under the very nose of the President during the whole of his term without molestation or even a threat.

The Southern Railway in 1894 purchased under foreclosure the Richmond & Danville, and the East Tennessee, Virginia & Georgia, two roads that had jointly controlled the Alabama Great Southern. The Great Southern runs from Wauhatchie, Tenn., to Meridian, Miss., and elsewhere, and parallels the Southern Railway between these points. In 1902 the Rock Island Company acquired through the C., R. I. & P. *Railroad* as a holding medium the St. Louis & San Francisco. The St. Louis & San Francisco and the C., R. I. & P. *Railway* compete at a large number of points, in the States of Missouri, Indiana, Iowa, Kansas and elsewhere. Unless the Southern and Rock Island acquired or controlled these competing lines for purely benevolent and uncommercial reasons, from which suppression of cut rates proceeds through a limited area, to a limited extent, as an incident and not as an object, we greatly fear these systems are also under the ban. They, like the eastern systems, have need to be circumspect, and moderate in the use of their opportunities, drawing public opinion to their support rather than to their overthrow. If it be possible to suppose that the Government would proceed, without regard to public sentiment, or to consequences, we can foresee that complications of indefinite and intolerable ramifications would ensue. If everything in the shape of railroad consolidations accomplished in the last fifteen or twenty years is liable to be undone, we may reach a stage of unrest and apprehension not yet experienced in the world of transportation or finance. To set the world by the ears is, however, not the mission or the promise of a Government in times of peace. And from a technical standpoint, to make out a clear breach of the law in the case of several of the consolidations mentioned would be difficult, perhaps impossible, and the Court would be slow to find it in the absence of practical and substantial public harm.

On the whole, therefore, while we think that quite all of the combinations cited, along with many others, are theoretically within the prohibition of the statute, in one phase or another, and while some are doubtless in more peril or are, at least, less secure than others, nevertheless we fear no startling developments, even after the election, but rather anticipate that, after all, things will go on much as heretofore, that consolidations, though pregnant with technical invalidity, will still proceed where the public require, and justify them, while others not more illegal will come to an untimely end, when effected without commercial necessity, and in defiance of public sentiment.

Railroad Borrowing on Short-Term Notes.

The present position of the large railroad corporation as a borrower on short-term notes is one which offers an unusual and somewhat perplexing situation. The two questions which naturally come to mind are, how soon can this form of borrowing be discontinued, and why should a big railroad corporation be forced to pay a rate of interest on its loan higher than the present rates in the time-money market? This form of borrowing on notes began in the early part of 1903, when the railroad companies found that the security market was in such a congested state that new stock and bond issues were out of the question. They were, therefore, forced to enter the money market and borrow money for a period of 18 or 24 months, issuing their notes in exchange. During the last 12 months the amount of money borrowed by railroad corporations in this way has been almost $150,000,000. (This sum includes the $50,000,000 loan of the Pennsylvania Company.) In December, 1903, a fair demand sprang up in the money market and several bond issues were disposed of, including the $10,000,000 first mortgage bonds of the Philadelphia, Baltimore & Washington. This demand ceased rather abruptly in the early part of February, when war was declared, and note issues began once more. It is not necessary to consider in detail why the outbreak of the war influenced the investment market. The possibility of large additions to the supply of securities in the market is always a sign for retrenchment. A long war like the Transvaal contest, which involves borrowing immense sums of money from a number of the markets of the world, is sure to reduce the available supply of capital and to throw large blocks of outstanding securities on the market. The fact that it is not known how long this present war is likely to last nor how costly it will prove, has made the investing public not only timid but indisposed to invest its money permanently or in large amounts.

The severe slump in security prices in 1903, resulting from the wild speculations in 1902, when new issues of bonds and stocks were flung out indiscriminately, and the uncertainty of the presidential election in the coming fall are also causes of this investment apathy. It is, of course, impossible to predict how long the present conditions will continue, but the financial situation appears to be slowly returning to its normal state. With a large crop harvested in the fall and the presidential election safely passed, the confidence of the public is likely to be gradually restored and the large outstanding note issues of the railroads should rapidly be funded as they come due by means of the regular bond issues. Granting, then, that for the present the railroads must borrow their money by issuing short-term notes rather than by the more preferable method of bond issues, it is necessary to go beyond these conditions to find a solution of the question, why the railroads are forced to pay such a high rate of interest on their loans. While brokerage houses can now obtain six months and eight months' money at four per cent., the big railroad corporations are compelled to pay five and even five and one-half per cent. on their notes. This seeming discrimination against the railroads in interest rates, however, is due to a variety of causes. In the first place, railroad corporations make their loans in such large amounts that they are compelled to accept the terms of the bankers. They cannot "bargain" for accommodations as the individual borrower can, and must take what they can get. In accepting large loans of this kind, the banking interests realize that, owing to present conditions they may not be able to dispose of all the notes of the railroad, and for this reason they charge a higher rate of interest. In the second place, the loan of a railroad corporation is generally in such bulk that it is not easily transferable, as is the case with a smaller loan, which may be quickly transferred if the occasion arises. It would not only be very hard for a banker or private individual to transfer his holdings of a large loan like the recent $50,000,000 issue of the Pennsylvania Company, but if it were known that such an attempt were being made it would be dangerous for the credit of the railroad company. Moreover, the loans made by the railroad corporations run for a longer period than the loan made by the average banking house, and, for this reason, an extra one or one and one-half per cent. is charged, owing to the uncertainty which the longer period of time naturally carries with it. During the past two weeks, the Baltimore & Ohio and the Chicago, Rock Island & Pacific Ry. Company borrowed $10,000,000 and $5,000,000 on short-term notes at an interest rate of five and four and one-half per cent. respectively, which is slightly higher than the present time-money market rates. Considering the character and the size of the recent loans made by the railroad corporations on short-term notes, and the length of time which they run, it is clear that the rate of interest paid by these companies is not as unfair as it at first appears.

Railroad Automobiles and Electrification.

Among the principal themes selected by the chairmen of English railroad companies for discussion at the recent meetings were experimental automobile trains and feeder-cars, electrification proposals, the use of larger goods trucks, tramway competition and municipal rating.

The automobile experiments have in several instances been very successful. The Great Western is thoroughly satisfied with the increase in local traffic along the Stroud Valley which has resulted from the running of a passenger steam motor car service between Chalford and Stonehouse. The number of passengers was increased eight-fold, and several other branch lines are to be nursed in the same way. The other experiment, that of running ordinary motor cars on the road, was tried at Helston and the Lizard at the end of the 1903 summer, and brought great accessions of traffic; indeed even at dullest times when the number of passengers was at a minimum the cars covered expenses. It is now announced that on March 1 the Great Western will introduce a road motor-car service between Beaconsfield and Slough, thus bringing the former place within one hour's journey of London. The North Eastern, which is so severely hit in its Newcastle district by tramway competition, is relying largely upon its system of single coach auto-cars to help it retain and regain traffic. Trial runs are being made with the 85 horse power Wolseley petrol cars which are to run between the Hartlepools. Each car will seat 52 passengers, and there will be a ten minutes' service each way. The London & South Western worked its Fratton Junction and Southsea branch line so satisfactorily with steam motor cars that the same principle is to be adopted on the Basingstoke & Alton Light Railway and other sections. The Midland Company has ordered one or two motor-carriages to be run on its newly completed Morecambe-Heysham line as an experiment, and if successful it is proposed to use them between Bedford and Hitchin and elsewhere. The Taff Vale Co. is also extending its Cardiff and Penarth steam motor car service.

Respecting electric traction, there is plenty of evidence that railroad chairmen and directors are pretty well agreed that there has been little change in the situation. They look upon electrification as a remote possibility, but in the meantime are using every opportunity that arises for betterment independent of conversion. The Great Eastern abandoned its Decapod engines, from which so much had been expected, and Lord Claud Hamilton recently expressed the opinion that in the present transition stage of electrical development, it would be suicidal policy to embark in vast capital expenditure which might not afford commensurate benefits. As a temporary expedient, then, the platforms at stations where the heaviest traffic is experienced are to be lengthened so as to accommodate 17 coach trains (instead of 15) at the busiest hours of the day, thereby increasing the seating accommodation by about 120 per train (15 per cent). The attitude of the London, Brighton & South Coast board toward electric traction is that "until a system likely to prove permanent in character and economical in working has been found" no serious expenditure will be incurred on that account. The London, Tilbury & Southend chairman "did not like to say anything about the estimates which experts were making as to the amount of traffic they would enjoy when a portion of their system was electrified," and we can leave this as being a quite unconvinced attitude, notwithstanding the fact that the company has obtained electrical powers from Parliament. The South Western has entered into a contract with the Underground Railways Company of London for electrically equipping the lines from Ravenscourt Park to Richmond and from Putney to Wimbledon, and these will be ready simultaneously with the electrical

installation on the Metropolitan and District systems. The Lancashire & Yorkshire is looking to the electrical working of its Liverpool-Southport section—upon which trial runs are now taking place—to help it to meet competition there, but that it is not likely to make much further change electrically yet awhile is easily seen from the trials which have lately commenced with a new high-power steam locomotive built to the designs of its recent mechanical engineer, Mr. Hoy. The new Harrow & Uxbridge Railroad will be completed in about a couple of months and though steam locomotion will be in vogue at first, it is intended to start working electrically when the Metropolitan is ready.

Some financial experts are saying that it is not because English railway boards are doubting the possibilities of electricity as a tractive agent that progress is not more speedily made in that direction, but rather is it due to the present condition of the money market which prohibits large capital expenditure for schemes on which the return may be slow in coming. It is quite true that the money market is not ready to find money for such things just now, and there is little prospect of immediate improvement in this respect. Furthermore, recent progress in single-phase traction motors both in Europe and America has emphasized to the railroad engineer's mind the state of transition which exists in the application of electricity to main line railroad traction.

March Accidents.

The condensed record of the principal train accidents which occurred in the United States in the month of March, printed in another column, contains accounts of 20 collisions, 19 derailments and four other accidents. Those which were most serious or which are of special interest by reason of their causes or attending circumstances occurred as follows:

	Killed.	Injured.
5th—Hammondsville, Ohio	6	4
7th—Jefferson City, Mo.....	3	0
8th—Kewanee, Miss.	6	4
18th—New York, N. Y.....	0	0

The March record shows no cases in which a passenger was killed outright; and, as is the case nearly every year, the moderating weather is marked by a lower record of deaths and injuries; but it is only by comparison that any satisfaction can be found in the present figures, for even as it is, we have 15 deaths (of employees) in the first three cases above tabulated, and it is reasonably certain that the Government bulletin, when it appears, will show a million dollars' losses from the accident record of the month—of which our record gives only the prominent cases.

Two of the three cases mentioned, Jefferson City and Kewanee, are chargeable to our blind dependence on a "system"—the time interval and the despatcher's order; a system which every month is shown by the accident record to be too brittle to be handled without breaking.

The New York City collision is notable as having occurred near the spot—just south of the Fourth Avenue tunnel—where, in January, 1902, a similar collision killed 17 passengers. That collision was the subject of much newspaper discussion at the time, and the parallelism between that and the case this year was, of course, quickly recognized and enlarged upon. The present case was explained to the reporters by an officer of the road as due to "falling snow and steam hanging low over the yard," impairing the engineman's view. As this explanation conveys the plain implication that steam or snow or fog in the air makes it particularly dangerous to run one train after another, it will not be strange if the public concludes that its denunciations of the signal system of the railroad are justified—for signals ought to provide for as safe movement when the view of the train ahead is obscured as when it is not. The collision occurred just at the entrance to the yard, where the block system ends. Whether or not the second train had passed a block signal set against it does not appear; but in either case the explanation given to the public embodies an element of injustice to the company, for it does not put the blame where it belongs. If the New York Central engineman who failed to stop before smashing the New Haven car disregarded a block signal at the entrance to the section his offense was very much like Wisker's in 1902; he had no business to be running at five miles an hour (as was stated) or even at five feet an hour, for there is no permissive blocking on that part of the road. The cloud of steam or snow had nothing to do with the question of right to the track. If, on the other hand, he was within the yard limits, and had the right to proceed if no obstruction was seen to be in the way, the fault was not in the presence of the cloud, impairing the view, but in the failure of the engineman to correctly estimate the length of his view, or to apply the brakes with sufficient promptness and force when the length of view had been determined. Fogs must always be reckoned with in running trains anywhere in New York City, and an engineman who cannot instantly adapt himself to the change in conditions that may at any time be imposed upon him by the formation of fog or clouds of steam, smoke or snow, needs to learn a lesson. It is a mistaken kindness to do or say anything that will encourage him, when he gets into trouble, to "blame it on the fog."

The electric car accidents recorded in March number 14; no persons reported killed, 37 reported injured.

The strike of railroad employees in Hungary, announced by telegraph last week, was evidently the result of long-standing discontent with a state of things with which neither men nor authorities were contented, but which the latter have not felt able to remedy. Since the war with France, Germany has enjoyed, on the whole, great prosperity, and the condition of the workmen has been more improved, probably, than in any half-century previous, and the wages of railroad men have been substantially increased. In Austria there has been by no means such an increase in prosperity; and though much progress has been made in many industries in Hungary, it has not greatly affected wages. The hard times which began about 1900 in all these countries are substantially over in Germany; but not in these adjoining countries. The railroad men there have seen their fellow-workmen to the north get on much faster than themselves. For years they have asked that something be done for them, and the responsible ministers and other authorities have usually answered frankly that something ought to be done for them; but that their resources did not permit them to do it, or not all that they themselves desired to do.

In Hungary by far the larger part of the railroad mileage is worked by the State, including many lines not owned by it. As universally in continental countries, the larger part of the employees in the responsible positions are members of a permanent corps, liable to dismissal only for gross faults, kept in service whether traffic is light or heavy, and entitled to certain promotions in course of years, and to pensions and other privileges. The State claims that these men have no more right to leave its service without notice than it has to discharge them without notice; and that a combination for the purpose of interrupting traffic is a conspiracy. Its remedy, however, seems a simple one. Substantially all of these men are in the army reserve, liable to be called out by the proper authorities, and then under military discipline obey orders or take the consequences. Soon after the declaration of the strike, the government ordered all the reserves to join their regiments. A large force of police and soldiers surrounded the strikers' camp, and the leader of the strikers was arrested for criticizing the action of the government. Not improbably the movement may result in more attention being paid to the claims of the men; some of which have been pressed for many years and seem to have been regarded as just.

Stuyvesant Fish.

Mr. Stuyvesant Fish, President of the Illinois Central, who has been chosen President of the American Railway Association, was born in New York in 1851. His father was Hamilton Fish, Governor of the State of New York, in 1849-51, and Secretary of State of the United

States during the administration of President Grant (1869-76). Mr. Fish was elected President of the Illinois Central in 1887. He was educated at Columbia College, New York, and has been in railroad service since 1871. In that year he was made a clerk in the New York office of the Illinois Central and later became Secretary to the President. For a number of years he was out of railroad service, being with Morton, Bliss & Co., bankers, of New York. In 1877 he was elected a Director of the Illinois Central and since that time has been intimately connected with the financial management of that company and its controlled lines. He was Treasurer and Agent for the Purchasing Committee for the New Orleans, Jackson & Great Northern; Secretary of the Chicago, St. Louis & New Orleans, and later Vice-President of that company. This position he held until his election to the Second Vice-Presidency of the Illinois Central. In 1884 he was chosen First Vice-President of the I. C., and three years later was put at the head of the company.

NEW PUBLICATIONS.

Directory of Directors in the City of New York. 1904. Published by the Audit Company, 43 Cedar street.

The sixth annual edition of this work has been revised to bring it up to March 1, 1904. It has been increased by 100 pages over last year's issue, and now contains 1,224 pages, 5¼ x 7¾ in. This is double the number of pages that were in the first edition in 1898. The directory consists of the alphabetical list of directors or trustees, with New York City addresses, followed by the names of the company with which each is connected. There is also an appendix of selected lists of corporations in banking, insurance, transportation, manufacturing, and other lines of business, alphabetically arranged, accompanied in each case by the names of the company's principal officers and by its directors or trustees. The directory is convenient as a list containing in small compass practically all the addresses desired by business men. It is also quite useful in tracing out corporate interests and affiliations, in addition to the purpose for which it is primarily intended.

Synopsis of the Patent Laws of the World. By John P. O'Donnell, M. Inst. C. E., M. Inst. M. E., M. Soc. C. E., etc. January 1, 1904. Fourth edition. Printed by Waterlow & Sons, Ltd. London Wall, London, England. Price 1s.

Mr. O'Donnell has collected in a pamphlet of less than 100 pages, 4¾ x 7 in., a synopsis which shows the substance of the patent laws as they now exist in all countries, and the scope of his work will be understood by reference to the index, which lists about 70 governments and dependencies, from Argentina to Perak and from Finland to Zanzibar. It must have taken an enormous amount of labor to get together the highly concentrated information contained in the brief paragraphs of this book, which should prove of great assistance to inventors desiring to take out patents in foreign countries or to assure themselves as to the status of patents outstanding.

TRADE CATALOGUES.

The Ingersoll-Sergeant Drill Company, of New York, has just issued catalogue No. 81, describing the Moran-Moser flowing system for the production of petroleum. This system, which is operated by compressed air in place of steam, has already proved very successful in the oil fields where it has been in use. It involves the use of a high-pressure air compressor usually operated at 350 to 600 lbs. pressure according to the depth and character of the wells. It has an aftercooler and receivers for sweating the moisture out of the air and avoiding freezing in the field lines; a system of small pipe lines varying from one inch to two inches in diameter to distribute the air around the field, and an equipment in the well and connections for flowing the oil directly into the tank regardless of distances or elevations. In this system, the rig walking beam, boxing, working barrel, building and engine are entirely eliminated, and the necessity of locating boilers in inaccessible places, and the transportation and delivery of water and fuel over long distances is avoided. With compressed air, the temperature is uniform and the contraction and expansion of heating and cooling lines which occurs with the use of steam is entirely avoided. The catalogue is illustrated with interesting photographs and contains a number of half-tones of the various kinds of air-compressors and rock drills manufactured by the Ingersoll-Sergeant Drill Company.

A. Leschen & Sons Rope Company, St. Louis, Mo., publishes a booklet with numerous illustrations of the application of its aerial wire rope tramways for carrying material over long distances of rough country, where there are no wagon-road facilities. This tramway is supported by towers placed at intervals varying from a few feet to as great a distance as 2,300 ft. At intervals of one mile tension stations are located to provide for the stretch and take-up of track ropes. The various sections of the tramway are operated by engines located at transfer points and the power is applied by means of large bevel gearing.

The Monarch Engineering & Manufacturing Company, Baltimore, Md., issues a pamphlet describing its Steele-Harvey metal melting and refining furnace. This furnace is composed of an outer steel shell firmly riveted and lined bottom and sides with a double row of fire brick, the crucible resting at the bottom on a square graphite block. The burners are operated by compressed air and fuel oil and consume from 10 to 15 cubic feet of air per minute. With these burners from three to 20 heats per day are obtained, varying according to the size of the crucible.

The Carlyle Johnson Machine Company, Hartford, Conn., publishes a small catalogue in leaflet form of its various kinds of single and double friction clutches. Leaflet No. 4 describes the smaller varieties of the single and double clutch with shafts ranging up to 1¾ in. in diameter and 7½ in. between hubs. Leaflet No. 6 illustrates the more powerful kind of single and double clutch with shafts up to 2¼ in. in diameter and 8⅝ in. between hubs.

The Crocker-Wheeler Company, Ampere, N. J., sends out Bulletin No. 44, containing a description of the Conneaut & Erie Interurban System. This electric railroad is operated by means of two 400-kw. Crocker-Wheeler generators with a current delivery of 560 volts and a normal capacity of 700 amperes each. The booster is

composed of two 150 Form-D machines mounted on the same base, direct connected and designed to run at about 600 revolutions per minute.

Broderick & Bascom Rope Company, St. Louis, is sending out to railroads a price list of "Power" and crucible steel switch ropes. Quotations are given on single and double patterns of each kind for lengths from 20 to 50 ft. and diameter from ¾ in. to 1½ in.

The Billings & Spencer Company, Hartford, Conn., issues a leaflet describing its drop forged machinists' hammers. These hammers are made of special steel and are hung with seasoned hickory handles. The leaflet contains tables of sizes, weights and prices of various types of hammers.

The Buffalo Forge Company, Buffalo, N. Y., sends out an illustrated mailing card describing its blowers and fans. These disc wheel fans are especially valuable for ventilating, cooling and drying purposes.

The Columbus Pumping Engine.

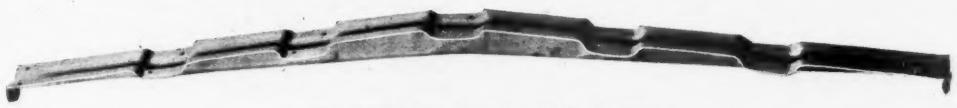
The desirability of gasoline engines for railroad pumping plants has created a demand for a design especially adapted to this work. To meet this demand the machine shown in the engraving has lately been produced by the Columbus Machine Company, Columbus, Ohio. It consists of a standard "Columbus" gasoline engine, mounted on a substantial cast-iron sub-base and geared with cast-iron cut gears to a power pump. The pinion is connected to the crank-shaft of the engine by a friction clutch which can be thrown in or out while the engine is in motion. The frame of the pump is of the girder type, the main bearings and cross-head guides being cast in one piece. The guides are bored and the cross-head is fitted with adjustable slippers top and bottom. A feature of this machine to which attention is especially directed is that the water-end is entirely separate and bolted to the pump frame. The advantage of this is that a railroad having a number of these machines, all of the same size, can keep one extra water-end in reserve. Should any machine require repair the extra water-end can be substituted for the one needing repair and the latter returned to the nearest shop where it can be fixed at much less expense than on the road. At the same time the pumping station need not be out of service for any great length of time. The Columbus Machine Company, builder of the machine, has been making gas and gasoline engines for years, and its product is well and favorably known.

The Cleveland Pressed-Steel Carline.

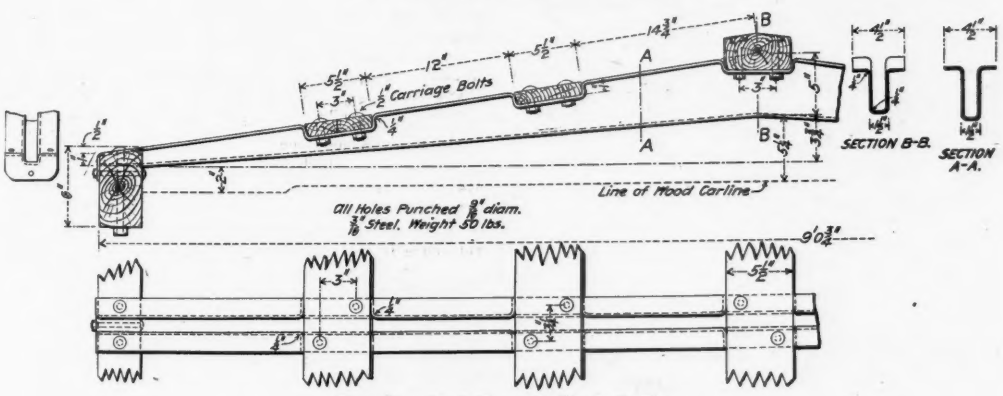
The pressed-steel carline invented by Mr. B. Haskell and applied to a lot of box cars of the Pere Marquette, was described and illustrated in the *Railroad Gazette*, Sept. 27 and Nov. 22, 1901. Since that time improvements have been made in the design, and the carline is now being made by the Cleveland Car Specialty Company, Cleveland, Ohio, under the patents of Mr. Haskell and of Mr. Geo. B. Maltby, both officers of the company. The most important improvement has been the addition of a lip projecting vertically downward at each end. These lips come outside of the side plates, to which the carline is fastened by ½-in. bolts, and do away with the tie rods used with wooden carlines to prevent spreading of the sides of the car at the top. Some of the several advantages claimed for this carline were enumerated in the previous articles. It combines lightness and strength, a 38-ft. car, for instance, requiring only seven—a considerable reduction from the number of wooden carlines needed—and while giving greater strength and rigidity to the roof, permits a saving of from 250 to 300 lbs. per car. The height at eaves with the pressed-steel carline is from 2 in. to 4 in. less than the wooden, with the same inside dimension, or the cubic capacity may be increased with the same outside dimension. The cubic capacity of the American Railway Association standard car is 2,448 cu. ft., and with the pressed-steel carline it has 2,537 cu. ft.

A 38-ft. car having seven of these carlines was tested with a load of 15,000 lbs. evenly distributed on the running board. The deflection was only ⅜ in., and no permanent set could be detected upon removal of the load. The use of this carline permits a construction that greatly reduces the possibility of leaky roofs. Being indestructible, in case the car is destroyed by fire or other cause, the carlines will have a scrap value of $2.50 to $3 a car. They are designed to be used with any style of roof, whether outside or inside metal, plastic or double-board and, it is claimed, will increase the life of the roof. In roofs where the under course of boards is laid lengthwise a special nailing strip is inserted in the carline. There are two designs of the pressed-steel carline—the standard U-shape section and a composite construction consisting of the wooden nailing strip combined with a half, or Z section of the standard carline.

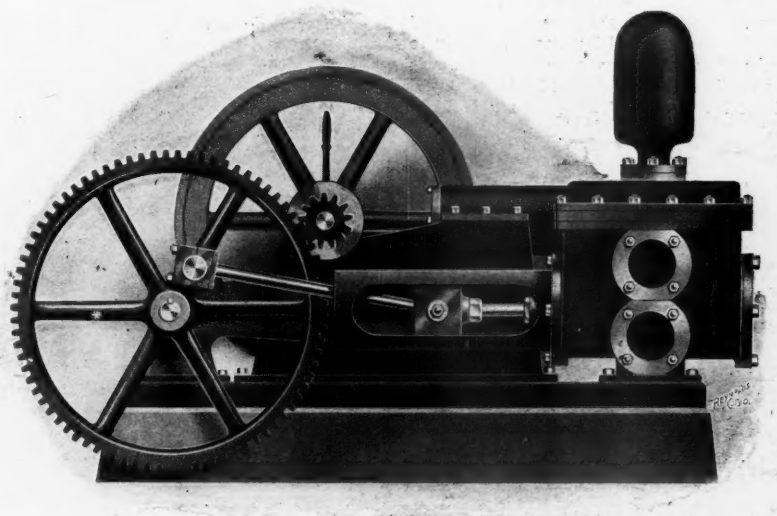
The Cleveland City Forge & Iron Company has recently installed a complete plant of the latest types of heavy hydraulic and pneumatic machinery for making the pressed-steel car specialties of the Cleveland Car Specialty Company, which is a new concern. In addition to the pressed-steel carline, of which there are said to be 75,000 now in service, the company will shortly have ready a new pressed-steel spring plank and some other pressed-steel specialties.



The Cleveland Pressed Steel Carline.



The Cleveland Pressed Steel Carline.



Columbus Pumping Engine.

Train Accidents in the United States in March.[1]

xc, 1st, 3 a. m., Illinois Central, Princeton, Ky., a passenger train collided with some freight cars which had been unexpectedly run from the siding to a main track and the engine fell down a high bank. The engineman was killed and two other trainmen were injured.

unf, 2nd, Charleston & Western Carolina, McCormick, S. C., a freight train broke through a trestle bridge which had been weakened by fire and six cars fell to the stream below. The engineman and fireman were injured.

eq, 2nd, Chicago, Rock Island & Pacific, Texhoma, Okla. T., a freight train was derailed by the breaking of the flange of a wheel of the tender and 10 loaded cars were wrecked. The fireman was killed and a brakeman was injured.

unf, 5th, Pennsylvania Lines, Hammondsville, Ohio, a train consisting of two locomotives and two cabooses broke through a bridge which had been weakened by floods and fell into Yellow Creek. Six trainmen were killed and four injured. A negro farmer living near the road had discovered the weakened condition of the bridge and had gone to a telegraph office to give notice of the fact.

o, 6th, Louisville & Atlantic, King's Tunnel, Ky., a derrick in a work train passing through the tunnel came in contact with the roof and knocked down large masses of earth and rock; one employee was killed and three were injured.

*rc, 7th, Missouri Pacific, Jefferson City, Mo., rear collision of freight trains in a tunnel, wrecking the caboose and several cars. The wreck took fire and was mostly burnt up; and large masses of the rock in the roof of the tunnel, having been disintegrated by the heat, fell upon the wreck. The conductor and two brakemen were killed and the bodies of two of them were destroyed in the fire. It appears that the foremost train had been stopped in consequence of the breaking of a coupling, and that no flag had been sent back to warn the second train.

*rc, 7th, 1 a. m., Illinois Central, Wilke, Iowa, a freight train which was entering a side track was run into at the rear by a following freight drawn by two engines, both of which were knocked off the track and fell down a bank. Six trainmen were injured, one of them fatally. The wreck took fire and, with a bridge on which part of the cars stood, was burnt up. There was a dense fog at the time.

bc, 7th, Wisconsin Central, Auburndale, Wis., butting collision of freight trains, wrecking both engines and 12 cars. Two trainmen were killed and a third was fatally injured.

bc, 8th, Central Vermont, West Berlin, Vt., butting collision between a freight train and an empty engine, wrecking both engines and several cars. One brakeman was killed and several other trainmen were injured.

*bc, 8th, Alabama Great Southern, Kewanee, Miss., butting collision between southbound express train No. 1 and a northbound freight train of the Southern Railway. The passenger train was running very fast and both engines and several cars were wrecked. The wreck took fire and the first three cars of the passenger train and six of the freight train were burnt up. One engineman, two firemen and three mail clerks were killed and four other trainmen were injured. The bodies of five of the killed were destroyed in the flames. It is said that the men in charge of the freight train overlooked a meeting order.

xc, 9th, 11 p. m., Forty-fourth street, Chicago, Ill., a suburban passenger train of the Chicago, Rock Island & Pacific ran into a freight train of the Chicago & Eastern Illinois, in consequence, it is said, of a misplaced switch. Three trainmen and seven passengers were injured.

xc, 10th, 1 a. m., Seaboard Air Line, Armour, Ga., a locomotive standing at a water tank was run into by a freight train, damaging both engines and several cars. One trainman was killed and another fatally injured.

dr, 11th, Atlanta, Knoxville & Northern, Murphy, N. C., a passenger train was derailed by a broken rail and the passenger cars were overturned. Several passengers were injured.

xc, 12th, Toledo, Peoria & Western, McCall, Ill., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one. Three trainmen were injured.

xc, 12th, 9 p. m., Hattiesburg, Miss., freight train No. 31, of the New Orleans & North-Eastern, ran into a freight of the Pearl & Leaf River, at the crossing of the two roads, derailing the engine and wrecking several cars.

unx, 13th, Kansas City Southern, Saginaw, Mo., a freight train was derailed and wrecked and three men, presumably trespassers, were killed.

rc, 14th, Chicago, Milwaukee & St. Paul, Beulah, Wis., a passenger train ran into the rear of a preceding freight, wrecking several cars. One passenger and two trainmen were injured.

15th, Washington & Plymouth, Pine Town, N. C., a car in a passenger train was derailed and overturned and several passengers were injured.

bc, 17th, Yazoo & Mississippi Valley, Cleveland, Miss., passenger train No. 27 ran over a misplaced switch and collided with a freight train, badly damaging both engines; engineman severely scalded; three passengers and two other trainmen injured.

rc, 18th, New York Central & Hudson River, Fifty-second street, New York City, a southbound passenger train of the New York, New Haven & Hartford, which had been stopped by a signal in the yard, was run into at the rear by a following passenger train of the New York Central, wrecking the rear end of the last car of the standing train and damaging its front platform. The New York Central train was running slowly and there was

[1]Accidents in which injuries are few or slight and the money loss is apparently small, will as a rule be omitted from this list. The official accident record published by the Interstate Commerce Commission quarterly is regularly reprinted in the *Railroad Gazette*. The classification of the accidents in the present list is indicated by the use of the following

ABBREVIATIONS.

rc	Rear collisions.
bc	Butting collisions.
xc	Miscellaneous collisions.
dr	Derailments; defect of roadway.
eq	Derailments; defect of equipment.
dn	Derailments; negligence in operating.
unf	Derailments; unforeseen obstruction.
unx	Derailments; unexplained.
o	Miscellaneous accidents.

An asterisk at the beginning of a paragraph indicates a wreck wholly or partly destroyed by fire; a dagger indicates an accident causing the death of one or more passengers.

some falling snow and steam which may have obscured the view of the engineman.

unx, 18th, Colorado & Southern, Walsenburg, Colo., freight train No. 27 was derailed and five cars of coal were ditched; two men stealing a ride were killed.

xc, 19th, Seaboard Air Line, Wilmington, N. C., butting collision between a switching engine and a freight train, doing slight damage. The switching engine, having been reversed and deserted, ran back at high speed and collided with an empty engine near the passenger station, badly damaging both engines. The fireman of the standing engine was beneath the boiler and was instantly killed, and the engineman was injured.

eq, 19th, Baltimore & Ohio, Baltimore, Md., a freight train was derailed by the breaking of the flange of a wheel of one of the cars; one trainman was killed and two were injured.

eq, 19th, Pennsylvania road, Tyrone, Pa., several cars of a freight train were derailed and damaged by the sudden stoppage of the train in consequence of the bursting of an air-brake hose. A brakeman was fatally injured.

unx, 19th, Central Vermont, Cambridge Junction, Vt., a passenger train was derailed and the engine and three cars fell down a bank. Five passengers were injured, one of them fatally.

unf, 22d, 4 a. m., Atchison, Topeka & Santa Fe, Reedley, Cal., a passenger train was derailed at a point where the roadbed had been washed by water from an irrigation ditch, and most of the cars of the train were overturned. Several passengers were injured.

unf, 22d, Baltimore & Ohio, Terra Alta, W. Va., a freight train was derailed by a rock which had fallen on the track and 12 cars fell down a bank. The fireman and one brakeman were killed and the engineman was badly injured.

o, 22d, Atlantic & Birmingham, Waycross, Ga., a switching engine was wrecked by the explosion of its boiler, and the engineman and fireman were injured.

xc, 23d, Lake Shore & Michigan Southern, North East, Pa., an eastbound passenger train ran over a misplaced switch and collided with some freight trains standing on a side track; four passengers, two trainmen and a workman in a freight car were injured.

o, 23d, Lehigh Valley, Wende, N. Y., the locomotive of a freight train was wrecked by the explosion of its boiler and the engineman and fireman were killed.

o, 23d, 4 a. m., Chicago, Indianapolis & Louisville, Bedford, Ind., a baggage and express car in passenger train No. 3 was destroyed by a fire, which was caused by the explosion of a lamp.

*xc, 24th, 2 a. m., Seaboard Air Line, Henderson, N. C., a passenger train ran over a misplaced switch and into a freight train on the side track, and the passenger engine was overturned. The engineman and several other trainmen were injured. One of the sleeping cars, taking fire from illuminating gas, was burnt up. It is believed that the switch had been maliciously misplaced.

bc, 24th, 11 p. m., St. Louis, Iron Mountain & Southern, Cadet, Mo., butting collision between southbound passenger train No. 5 and northbound mail train No. 4, badly damaging the engines and the foremost cars of both trains. A man stealing a ride was fatally injured.

unf, 25th, 1 a. m., Michigan Central, Niles, Mich., a freight train was derailed at a washout and the engineman and one brakeman were fatally scalded. The fireman was also badly injured by steam. Ten freight cars were wrecked.

unx, 25th, Erie Railroad, Wayne, N. J., the caboose of a freight train was derailed at a switch and fell down a bank. Two men in the caboose were killed and two other trainmen were injured.

xc, 29th, Baltimore & Ohio, Clarksburg, W. Va., collision between a freight train and a work train, the latter moving backwards. Three workmen of the work train, riding on the pilot of the engine, were killed.

xc, 29th, Lake Erie & Western, Peru, Ind., passenger train No. 26 ran over a misplaced switch and collided with a locomotive standing on the side track; several passengers injured.

29th, Seaboard Air Line, Henderson, N. C., a freight train broke through a bridge and eight loaded and four empty cars fell to the stream below.

eq, 29th, 1 a. m., Northern Central, Sparks, Md., a southbound freight train was derailed by the breaking of an axle, and a part of the wreck fell on the northbound track. A moment afterward a northbound train ran into the wreck and the engine and 20 of its cars were derailed, the engine being overturned. One engineman was killed and three other trainmen were injured.

dn, 29th, Chicago, Milwaukee & St. Paul, Eau Claire, Wis., a freight train was derailed at a misplaced switch; engineman killed, two other trainmen fatally injured.

bc, 30th, 7 p. m., Atlanta & West Point, Red Oak, Ga., butting collision between a passenger train and a freight. One engineman and one fireman were injured, the fireman fatally.

unx, 30th, Grand Rapids & Indiana, Grand Rapids, Mich., passenger train No. 7 was derailed and the engine was overturned. Four trainmen were injured.

unx, 30th, Texas, Sabine Valley & North Western Longview, Texas, a passenger train was derailed and the engine and several cars were overturned; eight passengers were injured.

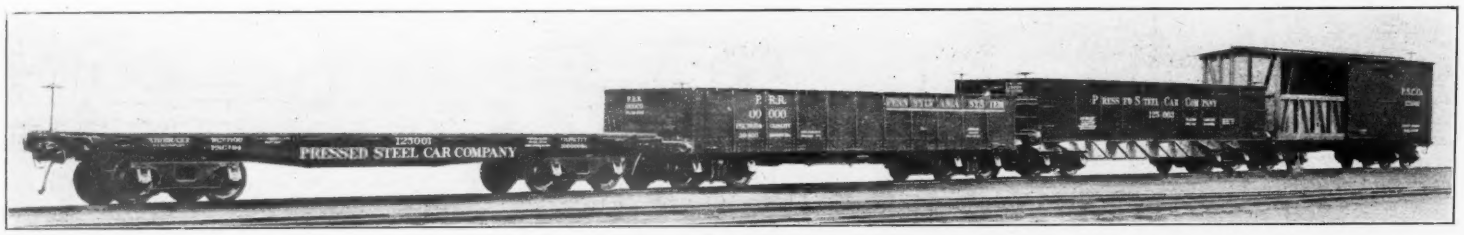
The statistics of Bessemer steel rail production published by the American Iron & Steel Association of late years have given the tonnage separately for rails weighing less than 45 lbs. per yard, from 45 to 84 lbs. per yard, and over 84 lbs. per yard. It appears from this that more than two-fifths of the Bessemer rails rolled last year weighed more than 84 lbs. per yard, and that in the last four years enough of such very heavy rails were rolled to lay probably 20,000 miles of track. Though the total rail production was a little less than in 1901 or 1902, the production of heavy rails was 76 per cent. greater in 1903 than in any previous year, which shows whither we are drifting.

St. Louis Exhibit of the Pressed Steel Car Co.

The accompanying photograph shows the exhibition train of four cars which forms part of the Pressed Steel Car Company's exhibit at the St. Louis fair. The cars embody the latest designs and appliances which the company has introduced, and each car is of 100,000 lbs. capacity.

The first car in the train is what is known as the Pennsylvania Railroad Company's standard class "GSA" type of pressed steel gondola; it is 40 ft. in length and has wooden drop ends for use in twin and triplet loads, drop doors, and weighs 39,400 lbs. This car is equipped with P. R. R. standard arch-bar trucks, Westinghouse air-brake and Westinghouse friction draft rigging, National hollow brake-beams, pressed steel bolsters, and Melrose cast-steel couplers, furnished by the Latrobe Steel & Coupler Co.

The second car is a pressed steel side dump gondola,



Pressed Steel Cars at the St. Louis Fair.

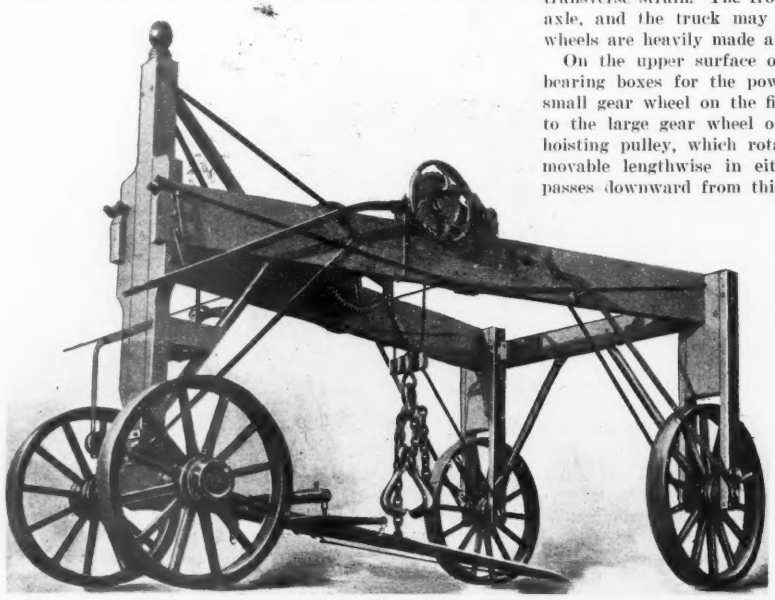
but built on an entirely new design. This car is 41 ft. 6 in. long and the whole bottom of the car consists of drop doors, fastened throughout the length at the center, and so arranged that the entire load can be dumped at either side of the track, while the doors when closed give the car an entirely flat bottom for shovelling out. This car is intended specially for carrying ballast, gravel, sand, dirt and similar freight that is dumped. There are two kinds of doors on it, to demonstrate both arrangements on the same car; on one side the doors are controlled by a sliding shaft, consisting of a rod running lengthwise with the car at the outside of the doors, the chains raising the doors being fastened to it. To open or close the doors the rod is turned so that they can be made to empty the car rapidly or slowly. At the same time the rod can be slid in position under the edge of the doors, thus relieving the pressure on the chains and acting as a support to the load held by the doors. On the other side of the car the controlling rod is fixed, that is, it merely opens or closes the doors by revolving, without acting as a support to them. The rods in either case are operated by means of a worm gear worked by a wheel similar to the ordinary brake wheel, one at each corner at the ends of the car. The car is fitted with pressed steel Diamond trucks, pressed steel bolsters, Westinghouse air-brakes, McCord journal boxes, Miner draft rigging, pressed steel brake-beams, and the Lindstrom hand brake, the same as is used on Pullman passenger coaches. This latter is the invention of Chief Engineer Lindstrom, of the Pressed Steel Car Company. The car weighs 41,500 lbs.

The third car is a box car, but entirely new in design, with structural steel underframing and steel superstructure. To show a portion of the superstructure part of the wooden sides and lining on one side has been removed. The dimensions of the car are the same as those laid down by the American Railway Association for a regular 36-ft. box car. The total weight of the car is 40,000 lbs., which is from two to three thousand pounds lighter than a similar wooden car with pressed steel underframing. The same ideas that obtain in the construction of a steel-framed building apply to this car, part of the weight of the load being borne by the sides of the structure. This helps to make the car lighter because lighter material is used in the underframing. The car is equipped with Pressed Steel Car Company's Fox pressed steel trucks, Westinghouse air-brakes, twin spring draft rigging, No. 2 security side doors, furnished by the Camel Company, Chicago; Chicago-Cleveland Company's Winslow roofing, Camel Company's adjustable journal bearings, with wedges complete; Hartman drop froged ball bearing center plates, malleable iron side bearings, pressed steel bolsters and pressed steel brake-beams. The carlines are pressed steel and the posts and braces are made of rolled angles.

The fourth car is an improved steel flat car, with wooden floor; 33,100 lbs. weight—much lighter than the average car with a similar capacity; Buckeye truck framing, pressed steel brake-beams and bolsters, McCord journal boxes, Tower cast steel coupler, Camel adjustable journal bearings and wedges, Westinghouse air-brakes and Sessions type "C" draft gear are used. In addition to the equipment mentioned the exhibit includes a pressed steel mine dump car, which is a new departure in steel construction; a pressed steel Fox tender truck frame, pressed steel body and truck bolster, pressed steel brake-beams, pressed steel side stakes and center plates, together with a number of model appliances for use in freight car construction. These cars embody the use of almost every standard freight car appliance now in use.

A New Stump-Pulling Machine.

The stump-pulling machine shown in the accompanying illustration is made by the American Rock, Stump & Tree Removing Company. The wheels and axles are designed for use on the roughest ground, and the whole machine is made strong enough to stand any loads which may be imposed upon it by the draft power of a team of horses. The pulleys and gear wheels multiply the power applied about 30 times, and the frame work is built to lift and carry 25 tons. A triangular wooden frame is fastened to the rear corner posts and to the front post by suitable braces and steel truss rods, and the short axles of the rear wheels are pivoted in the bifurcated lower ends of the corner posts. This method of pivoting allows the load to settle evenly on either end of the axles, which tends to prevent friction or breakage when the wheels are under transverse strain. The front post is pivoted in the front axle, and the truck may be completely revolved. The wheels are heavily made and fitted with 6-in. tires.



A New Stump Pulling Machine.

On the upper surface of the frame are mounted the bearing boxes for the power and working shafts. The small gear wheel on the first shaft transmits the power to the large gear wheel on the working shaft, and the hoisting pulley, which rotates with the power shaft, is movable lengthwise in either direction. A wire cable passes downward from this pulley under another pulley which is arranged to shift from side to side above the front axle, to accommodate itself to any sidewise movement of the draft.

A friction disk which has a groove cut in it to hold a flat metallic friction band is attached to the end of the power shaft. A ratchet wheel and hand wheel are also attached to the same end of the power shaft. The friction disk is thrown into gear by a hand lever, which, when depressed, releases the pawl on the ratchet wheel and brings the friction band on the disk into play. The hand wheel is attached to the power shaft to permit the lifting of light loads by hand.

To operate the machine the clutch hooks are grappled to the object to be raised and the hand lever is moved inward, shifting the top pulley downward until the clutch members engage. When the draft is applied to the cable the load is raised to its proper height by the pulleys and gearing winding up the cables. The load is then held in place by the pawl and ratchet mechanism while it is being moved over the ground. In lowering the load the hand lever is depressed and the ratchet unlatched; the friction band and disk then come into play and regulate the speed of the revolution of the shaft.

The Harris Combined Train Signal and Indicator.

The accompanying illustrations show a combined train signal and indicator which operate without the use of compressed air from the brake system. The apparatus is made by the Harris Manufacturing Company, Greenville, S. C., and consists essentially of a small compressor D in each car, a signal pipe A and an indicator and whistle in the locomotive cab. The signal cord in each car is attached to the ring in the end of the piston rod

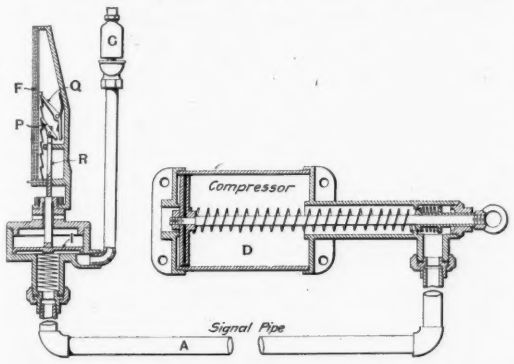


Fig. 1.

of the compressor. A slight pull on this cord sends an impulse through the signal pipe. This impulse blows the whistle G and forces the indicator piston I upward, thus registering a visual signal which corresponds with the audible signal. The visual signal remains in position until the indicator, by means of the handle L, is released by the engineman. The signal pipe A extends throughout the train and is coupled between the cars. The signal pipes already on the cars may be used. Each compressor is connected to a branch from the signal

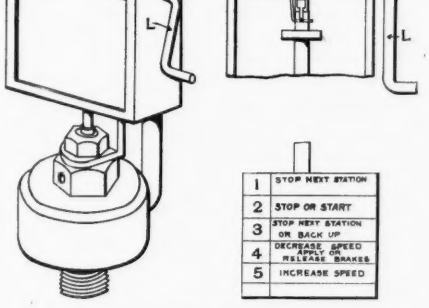


Fig. 2.

pipe. The signal pipe carries no pressure, the only pressure being due to the impulses given to the air in the pipe by the compressor. The signal whistle and indicator in the cab displace the usual signal apparatus and reducing valve.

The indicator is simple in construction, as shown by Figs. 1 and 2. The signal card has a metal rack on the back in which the pawls P and Q engage. When an impulse is given the piston I raises the pawl rod R, which in turn lifts the signal card one notch. The card is held in position by the pawl Q. The handle L, operated by the engineman, trips both pawls R and Q and allows the signal card to drop down out of view. After each impulse the piston I returns to the position shown in Fig. 1, so that if two pulls were given the signal

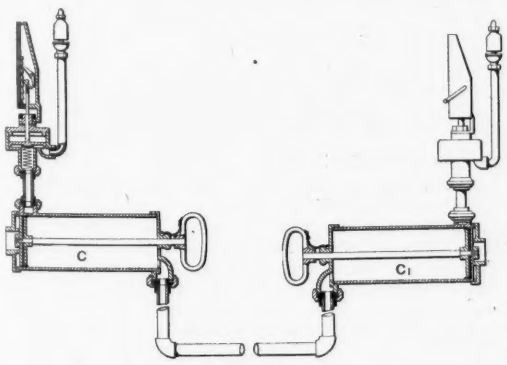


Fig. 3.

cord the indicator would register 2 to correspond to the two blasts from the whistle.

The apparatus is also designed for use on freight trains (Fig. 3), so that the engineman can repeat back the signal to the conductor or trainman in the caboose or the engineman can signal those in the caboose. An indicator and whistle and a compressor are provided in the locomotive cab and caboose, respectively. The cylinders C and C_1, one at each end of the train, form practically a part of the signal pipe. One or more impulses may be imparted to the air in the pipe from either end of the train by pulling out on the piston rod of the compressor. No whistle or indication will be heard or seen at the end of the train where the compressor is at work.

The Bagdad Railroad.

Details of the prospective Bagdad Railroad to connect the Mediterranean basin with the Persian Gulf are given in the "Zeitung des Vereins Deutscher Eisenbahnverwaltungen" for February 27, 1904. As is well known, the financing of this railroad has been in the hands of German bankers. A beginning was made with the Anatolian Railroad to run southeasterly from Scutari, opposite Constantinople, to Konia, in Asia Minor. Sections of this line have been built. The Bagdad Railroad is to connect with the Anatolian Railroad at Konia and continue southeasterly to the Persian Gulf. After long delays the Turkish Government gave the necessary "concession" for its construction on January 21, 1902. The railroad is to cross the Taurus Mountains and lead to Adana, near the coast of the Mediterranean. An existing line from Adana to Mersina will give access to a harbor, and a branch line to Kastambul is to give access to another. Should the Turkish Government at some future time wish to connect the port of Tripolis with the main line of the railroad, the Bagdad Railroad is given a monopoly of building the necessary branch. Other important markets, like Aleppo and Orfa, are also to be reached by branch lines. The main line continues eastward, crosses the Euphrates and reaches the banks of the Tigris at Mossul; then it continues on the right bank of that river to Bagdad. A branch line is to lead to Khanikin, where it will tap the Persian pilgrimage trade. South of Bagdad the railroad leaves the valley of the Tigris, crosses the Euphrates to its western shore, and leads southeasterly to Basra and El Kueid on the Persian Gulf. The length of the Bagdad Railroad from Constantinople to the Persian Gulf will be about 1,860 miles, say half as great as that of the Trans-Siberian Railroad. The expense of building the line and the insignificant traffic at present available make a government guarantee of interest essential. How the Turkish Government can and will supply such a guarantee satisfactory to prospective investors, is the great problem. The railroad is to be single track for the present, though land sufficient for double tracking is to be acquired. The "concession" makes minute provision for building the road. Bridges are to be of iron or stone; rails are to be 36 ft. long and to weigh 75 lbs. per yard. Stations are to be about 12 miles apart. Further provisions are made for the maintenance of the eventual roadbed and rolling stock; minimum rates are established for the transportation of passengers, freight and the mails. The speed of the trains and the number of fast trains and accommodation trains are prescribed. It remains to be seen whether these painstaking provisions will ever be carried out. For somewhat more extended comment on the project, with map, see the *Railroad Gazette* for August 8, 1902.

TECHNICAL.

Manufacturing and Business.

Theodore Cooper, Consulting Engineer, will remove to 45 Broadway on May 1.

The Lehigh Valley, it is reported, will soon be in the market for a lot of machine tools.

The Walter A. Zelnicker Supply Company, of St. Louis, Mo., has received a large order for its double clutch car movers for export.

Mr. John B. Allan, general manager of sales of the Allis-Chalmers Company, has resigned his position and will take a vacation for several months.

Bids are wanted until July 14 by the Peruvian Government for the construction and operation of the projected railroad between Lima and Pisco.

The Chicago offices of the Baldwin Locomotive Works and of the Standard Steel Works will occupy suite 623-25 Railway Exchange Building after May 1st.

A contract has been awarded to the New Jersey Bridge Company, of Manasquan, for building a steel bridge 650 ft. long over the Delaware River at Belvidere.

Mr. Arthur West, Assistant Chief Engineer of the Allis-Chalmers Company, has resigned his position and will go to the Mediterranean for rest and recreation.

The Consolidated Car Heating Company has appointed Mr. C. C. Nuckols assistant to Mr. W. S. Hammond, Jr., who is District Manager, with headquarters in Chicago.

A quarterly dividend of $2 per share from net earnings has been declared by the Pullman Company, payable May 16 to stockholders of record at close of business, April 30.

The Parker Machine Company, of Buffalo, has been incorporated in New York with a capital of $250,000. The directors are R. F. Rankine, J. H. Belser and F. H. Greene, of Buffalo.

The Chicago city sales offices of the Sherwin-Williams Company have been moved from the Fisher Building into suite 630-32 of the Railway Exchange, Jackson and Michigan boulevards.

The Sullivan Machinery Company, Chicago, has moved its offices from 135 Adams street, to rooms 1502-14 in the new Railway Exchange Building, corner Jackson and Michigan boulevards.

The Pennsylvania Steel Shafting Company has been formed at Spring City, Pa., with a capital of $125,000. W. P. Snyder is President, and A. Jackson Wright, of Philadelphia, is Treasurer.

The Watson-Stillman Company will move its office to 46 Dey street, New York, and about the same time all the machinery will be removed to the company's new works at Aldene, Union County, N. J.

The Robinson Iron & Steel Co., it is reported, will build new works at Scottdale, Pa. Residents have subscribed for about $125,000 of the capital stock. The company will make planished iron by a secret process.

The Netherlands Minister of Colonies will soon award contracts for 4,000 tons of rails, ten bridges and a large quantity of railroad material for use in the Dutch East Indies. Address Mart Nyhoff, The Hague, Holland.

Charles E. Ingersoll has been elected a director of the Philadelphia Electric Co. to fill the vacancy caused by the death of William L. Elkins. Mr. Ingersoll is a director of the North Pennsylvania and the Midland Valley railroads.

The Wood Railway Signal Company, of Fostoria, Ohio, recently incorporated with a capital of $150,000, has two of its brick buildings completed and has commenced work on a third. J. W. McDonel is Secretary and Treasurer.

The American Power Company is planning to begin work on the mill sites and power dam at Fort Francis, Ont. The plans call for two power houses and a complete system of sluices and gates with long chutes and openings.

The National Brake Co., Inc., of Buffalo, has been formed in New York with a capital of $50,000 to make brakes and other car appliances. Griffin A. Ackley, Buffalo; William D. Brewster, Syracuse, and others are incorporators.

The Crocker-Wheeler Co., manufacturers of electric generators and motors, will, on May 10, open a branch office in the Hibernia Bank Building, New Orleans. Mr. W. P. Fields, now of the St. Louis office of the company, will be in charge.

The Buda Foundry and Manufacturing Company, Chicago, and the Paige Iron Works, which is the frog, switch and crossing department of the first-named company, removed their offices on April 16th from 427 Monadnock Block to 637 Railway Exchange Building.

The works of the Structural Steel Car Company, at Canton, Ohio, consisting of 33 acres of ground, with buildings suitable for making steel railroad cars, will be sold at a public auction April 30, by order of the United States Court for the Northern District of Ohio.

A. Leschen & Sons Rope Co., St. Louis, Mo., sends out a handy little rope gage made of a thin piece of celluloid. Semi-circular notches, varying in diameter from ¼ in. to 1¼ in., corresponding to standard rope sizes, are cut in the edges and the size of any rope may be quickly gaged by fitting the corresponding size of notch over it. This company makes iron, steel and galvanized wire rope of every description including the patent flattened strand Hercules wire rope.

The May issue of *Graphite*, published by the Joseph Dixon Crucible Co., Jersey City, N. J., contains among special features a photograph of that portion of the Baltimore ruins wherein was located the Union Trust building, in which the Dixon Company had its Baltimore office. Everything in the office was absolutely destroyed except a few dozen graphite crucibles, one or two graphite stirrers, and a few cases of Dixon stove polish, which are now in the window of the Philadelphia office as incombustible relics.

The resignation of Ervin Dryer, who has been with the Westinghouse Electric & Manufacturing Company for 16 years, has been accepted, and Mr. Dryer has already entered the service of the Allis-Chalmers Co., with headquarters in the New York Life Building, Chicago. Mr. Dryer has a wide reputation and acquaintance as a salesman in the electrical and mechanical field. He is to devote his attention to the engine work of the Allis-Chalmers Co., and to the Bullock electrical apparatus, now under the control of that company through its purchase of the Bullock Electrical Co., of Cincinnati.

The Rand Drill Company, of New York, has just put in two compressed air plants for the United States Government; one is at Fort Stevens, Ore. It consists of one Rand "Imperial" type 10 air compressor, having duplex steam cylinders, 7 in. diameter, and compound air cylinders, 10 in. and 6½ in. diameter, with 8 in. stroke, and several "Imperial" pneumatic riveting and calking hammers and piston air drills. It is understood that the plant will be used for the improvement of the mouth of the Columbia River. The other plant is at Tuscaloosa, Ala. It consists of one Rand 8 x 8 x 12 in., Class C, straight-line, steam driven air compressor, with pneumatic long-stroke riveting hammers and piston air drills.

Iron and Steel.

The Portsmouth Steel Company, of Portsmouth, Ohio, is preparing plans to build an additional three-roll plate mill at its works.

The Birmingham Steel & Iron Company, of Birmingham, Ala., it is reported, is building a ten-ton steel furnace. The company intends to make steel castings in the future instead of iron.

At the meeting of the Bessemer Ore Association, April 20, an agreement was reached to fix the price of Bessemer ore at $3.50 per ton. This agreement is understood to

practically insure that there will be no general cut in prices for another year.

The United States Steel Corporation, it is reported, will spend over $500,000 in improvements to its sheet-steel mill at South Sharon, for which plans are ready and work will be started in a few weeks. It is proposed to make the mill a continuous one. This mill was originally built by the United States Steel Corporation at a cost of about $500,000, but has never been run. About 1,000 men will be employed. The pipe mill, which has never been operated, will also be started soon. The entire works cost in the neighborhood of $1,500,000.

The Lackawanna Steel Co. will have its new open-hearth and structural steel plants in operation during June. The bad weather has delayed work and the plants which were to have been ready in May will not begin turning out material until June. The rail mills are going at full capacity. Although new orders for rails are slow coming in, the general improvement in other lines is marked. Settlement of the strike among building trade employees in New York has had a noticeable effect upon the structural steel trade outlook and has stimulated activity generally.

Proposed Bridge Campbellton, N. B.

Application has been made to the Dominion Parliament by Thomas Malcolm, a railroad contractor, of Edmundston, N. B., and other capitalists, to build a bridge for the International Railroad Bridge Company, of New Brunswick, at Campbellton. The proposed structure will be 3,400 ft. long exclusive of approaches, and will have 16 masonry piers. The spans are to be 200 ft. long and 30 ft. above high water. The bridge will connect the opposite sides of the Bay of Chaleurs, giving the Gaspe peninsula a better southward connection.

M. C. B. Circulars of Inquiry.

The Master Car Builders' Association Committee on outside dimensions of box cars has issued a circular of inquiry, illustrated with several drawings, asking the expression of preferences in the design of side and end framing, etc. The committee on rules for loading long materials also sends out a circular of inquiry, asking expressions of opinion in regard to twenty or so proposed or present clauses in the loading rules. The circulars are dated April 12 and April 15, respectively.

Exhibit of the Big Four at St. Louis.

The Big Four will have one of the most striking exhibits in the Transportation Building at the World's Fair, St. Louis. One of the new Atlantic type engines recently turned out by the Brooks Works of the American Locomotive Company, will be mounted on a turntable in the center of the building. The turntable will rest on a pedestal about 12 ft. high and the engine will be in a perfectly balanced position so that the table can be turned on its center bearing without support at the ends. The driving wheels will be lifted off the rails about ⅛ in. and will be revolved by beveled friction rings mounted on the axles. The exhibit will be placed in position this week in time for the opening of the fair on Saturday, April 30.

Electric Road at Christchurch, New Zealand.

The New Zealand Electric Construction Company, which was recently organized for the purpose of developing water powers in New Zealand, has received the contract to build lines in Christchurch aggregating 30 miles. The municipal authorities will operate the lines. The United States Steel Products Export Company, Battery Park Building, which handles the foreign business of the United States Steel Corporation, has secured the contract for the rails and feeder cables. There will be about 6,000 tons of rails and accessories. The John Stephenson Company, of Elizabeth, N. J., has the contract for 35 cars. The motors will be of General Electric Company's build and the trucks from the Peckham Manufacturing Company. The power house will have an initial capacity of 1,200 horse power. Curtis turbines and Babcock and Wilcox boilers will be used.

Pig Iron Production for March.

A recent monthly statement issued by the *Iron Age* shows that the production of anthracite and coke pig iron is rapidly increasing and has now almost reached its normal rate. From a minimum production of 846,695 tons in December, it reached 1,465,507 tons in March. This is in excess of the figures for January and February, 1904, which were 921,231 tons and 1,205,449 tons respectively and compares very favorably with those for August and September, 1903, which were 1,614,128 tons and 1,596,703 tons. The following table of furnace capacity since December 1, 1902, indicates the rapid resumption of work:

	Coke capacity per week.		Coke capacity per week.
April 1, 1904	337,257	July 1	384,825
March 1	308,751	June 1	388,178
Feb. 1	273,692	May 1	373,496
Jan. 1	185,636	April 1	368,215
Dec. 1, 1903	244,156	March 1	347,424
Nov. 1	273,715	Feb. 1	335,339
Oct. 1	353,142	Jan. 1	346,073
Sept. 1	360,197	Dec. 1, 1902	336,617
Aug. 1	353,681		

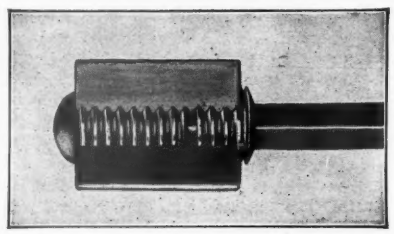
Returns from all the plants of the United States Steel Corporation show that the production of pig iron in March was 913,412 tons, as compared with 756,230 tons in February, 502,994 tons in January, and only 406,730 tons in December. This is an increase in three months of nearly 60 per cent. The increase in the production of the merchant furnaces is not so marked, being 552,095 tons in March, against 416,237 tons in January. The number of stacks in blast on March 1 was 203 and on April 1 it had reached 358. Notwithstanding the increased output of the merchant furnaces, the aggregate of their stocks sold and unsold has been steadily decreasing. On January 1 the total stocks of the East, Central West and Northwest and South divisions were 597,904 tons; this decreased to 576,904 tons on February 1, to 529,545 tons on March 1, and to 455,673 tons on April 1.

In connection with this showing, it is interesting to note the increases in iron and steel exports. In February the following exports of iron and steel commodities were made: Steel billets, ingots and blooms, 26,205 tons; steel rails, 8,465 tons; structural iron and steel, 2,950 tons; steel wire rods, 570 tons; hoop, band and scroll 440 tons. These figures show fair increases over the corresponding figures for January, which were: Steel billets ingots and blooms, 17,184 tons; steel rails, 4,960 tons; structural iron and steel, 2,340 tons; steel wire rods 343 tons; hoop, band and scroll, 219 tons.

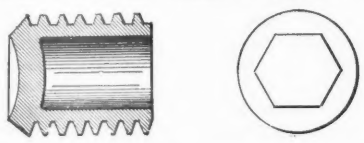
The total steel rail production in the United States for the past year amounted to 2,813,593 tons, which is only 62,710 tons less than the total production in 1902 the record year for the iron and steel industries in the country. The total for 1902 was 2,876,293 tons, and for 1901, 2,836,273 tons.

A New Set Screw.

The accompanying illustrations show a new design of set screw to take the place of the headless and square head screws. The new screw is made of steel with a hexagonal hole extending nearly to the bottom. A special hexagonal



wrench is used to screw it in place. The hollow feature gives the screw an elasticity that is desirable and prevents it from working loose under changes of temperature. The screw can be locked by putting two in a hole and the thread strain is equalized. One length is suitable for any length of hole. The half-tone illustration shows the screw used as a gib-screw. The gib-screw is locked by a short section of a screw without a bottom so that the



hexagonal wrench may be inserted to loosen the lock-screw, then pushed through to engage the gib-screw to adjust it. This does away with two wrenches to adjust a gib-screw. It is claimed that a hollow screw in a hole ⅝-in. deep held more than twice as much as a slotted screw tightened with a wrench on a screw driver. The screw is sold by Hammacher, Schlemmer & Co., New York.

THE SCRAP HEAP.

Notes.

The Erie canal is to be open for business on May 5. It is expected that lake vessels will start from Chicago and from Buffalo on May 2.

The Indiana Shippers' Association, an organization recently formed at Indianapolis, proposes to secure the passage of a law to establish a railroad commission in that State.

The city ordinance of San Antonio, Texas, forbidding the sale of railroad tickets except by authorized agents, has been sustained by the County Court, and J. K. Yates, a ticket broker who was arrested and challenged the validity of the ordinance, has been held for trial.

"Loupurex Limited" is the name which it is said is going to be given to a new passenger train which the Pittsburg & Lake Erie is going to put on for the accommodation of passengers going to the World's Fair at St. Louis; and the woman who made that outlandish word receives a prize of $50 from the railroad company.

In the United States Court at Sioux Falls, S. D., April 15, the Chicago, Rock Island & Pacific paid a fine of $100 and costs for using a freight car which lacked a clevis in the lifting chain of the uncoupling lever, thus making the use of the car unlawful because the coupler could not be operated without a man going between the cars.

Beginning May 15, Pullman sleeping cars are to be run through between Jersey City and St. Louis over the Lehigh Valley, the Lake Shore & Michigan Southern, and the Cleveland, Cincinnati, Chicago & St. Louis. The announcement indicates that this service will be maintained on two trains each way, daily, one of them being the Black Diamond Express.

In the United States Senate the appropriation bill for the post office department has been amended by a provision for the employment of 300 additional railway mail clerks. A press despatch from Washington says that the force of men in the mail cars is insufficient to do the work, and that carloads of mail (presumably second-class and third-class matter) are frequently held over from eight hours to 24 hours because it is impossible to sort the mail in season for the trains which ought to take it.

At Memphis, May 11, the Interstate Commerce Commission, at the request of the Memphis Freight Bureau and of the railroad company, will inquire into the reasonableness of rates on freight from Memphis, Tenn., to local points in Arkansas on the St. Louis South-Western as compared with rates to the same points from Little Rock and Pine Bluff, and also into the reasonableness of rates on cotton from points in Arkansas on the St. Louis South-Western to Memphis as compared with the rates from such points to St. Louis, Cairo and other eastern destinations.

The railroads centering in Chicago have secured the co-operation of a business men's committee, representing a large number of prominent firms of that city, in a plan for preventing the ticket brokers of the city from dealing in non-transferable tickets. If an injunction can be secured against them the railroads will probably then allow stop-overs at Chicago on excursion tickets by way of that city to the St. Louis World's Fair. It is said that the scalpers have raised an unusually large fund to defend themselves in court. The amount of money paid by ticket brokers for office rent in Chicago is estimated at $500,000 annually.

According to a press despatch from Chicago, April 26, the grain rate war between the Western railroads is settled. Under the basis adopted rates on wheat to Chicago will be the same from all Missouri River points—12 cents per 100 lbs. Heretofore, under normal conditions, the rate from Omaha to Chicago has been two cents higher than the rate from Kansas City. The rate on wheat from Kansas City to Chicago will now be six cents less than to Gulf ports. The rate from Chicago to New York on wheat for export is 18 cents, making a through rate from Kansas City to New York via Chicago of 30 cents, against a rate of 18 cents from Kansas City to the Gulf.

The Panama Canal.

The sale of the property and rights of the French Panama Canal Company to the United States was made in Paris last week, and was ratified by the stockholders of the company on April 23.

Fire at West Albany.

Seven passenger coaches, two dining cars and six other cars were destroyed by fire on April 27, in the West Albany shops of the New York Central & Hudson River Railroad. The loss on cars and buildings is estimated at about $100,000.

Disastrous Derailment in Mexico.

A press despatch from the City of Mexico, April 19, reports the derailment of a passenger train on the Mexican Central near Zacatecas, wrecking the engine and injuring nearly every person on the train. Nine passengers and two trainmen were killed, and over 30 other persons were injured.

River and Harbor Bill.

The River and Harbor appropriation bill which has been passed by the House of Representatives has had amendments added by the Senate Committee, among them one authorizing contracts to be made during 1905 for improvements to the Mississippi River, amounting to $1,000,000. Several new surveys have also been authorized by the Senate.

Michigan Immigration Bureau.

A press despatch of April 22 says that the principal railroads of Michigan have established a bureau, to be maintained by the companies jointly, to encourage immigration to that State and to aid owners in disposing of land. The following roads are members: Ann Arbor, Detroit & Mackinac, Grand Rapids & Indiana, Manistee & Northeastern, Michigan Central and Pere Marquette. The executive officer of the bureau is J. E. Merritt, with headquarters at Saginaw, Mich.

Ice Crusher for Michigan Central..

According to press notices, the Michigan Central has ordered from the Great Lakes Engineering Company, of Detroit, an ice-crushing car ferry to go into commission next October and run between Detroit and Windsor. The new boat will cost $315,000 and will be a propeller with two screws forward and two aft, each operated by an independent engine. There will be three tracks on deck with a capacity of 21 cars. The vessel will be 328 ft. long over all, 19 ft. 6 in. deep and 64 ft. wide.

Electric Railroads in Peru.

A *Consular Report* from Callao, Peru, says that the first electric railroad in that country was opened on February 17. The new road is eight miles long and runs from Lima to Chorrillos, touching at Barranco, a popular neighboring seaside resort. The purpose of the road is to afford cheap and rapid transit between Lima and Chorrillos. The cars and electric plant are of American manufacture. Work is now in progress on another electric tramway line between Callao and Lima. This road will be about 10 miles long and will be double track. The opening of this line will probably cause a sensible diminution in the rather high passenger rates now charged by the two (steam) railroads in operation between Callao and the capital.

The Aweful Musquittos.

Railways (Calcutta) prints the following plaintive appeal from a parcel clerk in India to his superior. New Jersey papers please copy.

"Hrd. Sir,—I have been compelled to disturb your noble

disposition and beg to ask you to allow me with the fan now and then not continually whole day, as the aweful musquittos in this office at least under my seat giving such bite that I am always restless and to work, besides I have to deal all day long with the coolies. Moreover, I beg your pardon, I am not luxurious at home, being a poor man, however, I make remedy for the gnats with hand fans, etc., when we are disturbed by. Not only bitings of the gnats disturb a man but brings disease such as malirious fever, etc. Hope you will very kindly excuse me for taking so much indulgence which is only for life's sake."

Victorian Railways (Australia).

The recent report of the Victorian Railways in Australia for the month of January, 1904, shows that they are rapidly approaching a dividend-paying basis. For several years past they have had to exact a subsidy of from $1,500,000 to $2,000,000 a year from the general revenue, to make good their perennial state of deficit. The improvement shown is largely due to the efforts of the Board of Railroad Commissioners, who were appointed to take charge of the affairs of the Victorian Railways in June, 1903. The report for January shows that although 33,287 less train miles were run during that month than in the corresponding month in 1903, gross earnings increased from $1,470,035 to $1,801,545. Operating expenses, on the other hand, increased only $4.700, leaving a handsome gain in net earnings of $326,810. The percentage of operating expenses to gross earnings during January, 1904, was 50.02, as against 60.98 in January, 1903. This report is all the more creditable when we consider that the Commission has only been working for six months, and is a feather in the cap of Mr. Tait, the new manager from Canada.

Strikes.

On Friday of last week the boilermakers in the shops of the New York, New Haven & Hartford, at New Haven, went out on strike, the reason given being that the railroad company had refused to increase their pay 15 per cent. and at the same time reduce the working hours from 10 to 9. Press despatches indicate that the boilermakers at the other shops of the company left work at the same time; and negotiations seem to be going on between the machinists in the shops and the officers of the company. At last accounts the road had secured some non-union boilermakers, protecting the shops from interference by a strong force of guards, and had offered to shorten the working day as asked for; but the increase in pay was refused.

From Decatur, Ill., April 25, it was reported that the car inspectors, oilers, and repairers of the Wabash road had struck, to the number of 200, demanding an increase in wages, a recognition of the Carmen's Union, and other things.

On April 22 the captains of the freight steamers of the Rutland Railroad, plying between Ogdensburg and Chicago, struck, and, according to the press despatches, caused a great blockade of freight at Ogdensburg.

A press despatch of April 21 reported that 500 men in the shops of the Norfolk & Western at Portsmouth, Ohio, had struck on account of a change in the working hours.

Motor Cars for Bavarian Railroads.

It is announced that the department of traffic of the Bavarian government has asked for bids for motor cars to be used on the Bavarian railroad lines in connection with the present steam service. For main lines the cars are to be of two sizes, the larger to have a seating capacity of 60 passengers and standing room for 20 more, with a compartment for baggage, and the smaller seating 40 persons. The motor cars for branch and local lines are to be of less capacity. They are to be fitted for passengers, freight, and mail service. The cars of each type described are to provide for first, second and third class passengers, with smoking compartments and facilities for heating and lighting. The speed attainable by the larger cars without trailer is to be 45 miles per hour, while the smaller cars are designed to attain a speed of 36 miles per hour. The maximum speed of the cars for use on branch lines will be 30 miles per hour. The general features, including the kind of power to be used, are to be left to the bidding firms. July 1, 1904, is fixed as the date on which propositions should be submitted to the department. The government has also asked for bids for motor wagons suitable for street and country highway service in connection with the Bavarian railroad and postal systems. The wagons designed for country highways are to be adapted for carrying passengers and for the delivery of freight and express matter to and from the railroad lines over considerable distances, when required. Cars similar to those above described have been in use for seven years on all the principal railroad lines of that part of Bavaria known as the Rhine Pfalz.—*Consular Report.*

Electrical Service on the Lancashire & Yorkshire Interrupted.

The Lancashire & Yorkshire has had a serious misfortune in connection with its electrified section between Liverpool, Southport and Crossens. The accident which has occurred is not in any way an electrical engineering failure, and yet the entire section has had to revert to steam traction, and it is at present quite indeterminate when it may be possible to resume electrical working again. The trouble has arisen through subsidence at the power generating station at Formby, the sandy subsoil having yielded in spite of the large quantities of concrete which were employed in the foundations. The station had been at work for several months for the operation of a number of electric trains, but it was only on Tuesday, April 5, that the full service of these trains was running for public traffic. On the following Monday, April 11, when the public appreciation of the change was becoming marked, the entire electric system was put out of service, and cannot, according to reports, be run again until everything has been set right at Formby.

There had been a friendly rivalry between the Lancashire & Yorkshire and the North Eastern to see which could have its electrical section operating first. The former was first with its trial runs for press deputations, but the latter had a short length of line between Newcastle and Benton running a 15-minute electric service on March 29, seven or eight days before the Liverpool railroad was opened. The present accident is specially unfortunate in view of the general interest throughout English railroad circles in the Lancashire and Yorkshire electrification, which has had great weight with at least one line and has influenced the County Down Railway to have a scheme drawn up for the electrification of its Belfast & Bangor branch, and to ask Messrs. Dick, Kerr & Co., the contractors for the Liverpool line, to prepare an estimate.

Parlor-Car Fares on the New Haven.

The Interstate Commerce Commission, in an opinion by Chairman Knapp, has announced its decision in the case of Hewins against the New York, New Haven & Hartford. The company has numerous through daily trains between New York and Boston on which the through parlor car fare is $1. From intermediate points the parlor car fare on all trains is 50 to 75 cents, according to distance, but [from New York or Boston] the parlor car rate on three trains is $1 to any intermediate point. Complaint was made that the charge of $1 to intermediate points constitutes unlawful discrimination. The Commission holds that it is not a violation of law to charge more in one direction on certain trains than is charged in another direction on all trains between the same points; and also that defendant furnishes adequate parlor car accommodations at the lower rates for local and short-distance passengers, and the discrimination against such passengers by reason of the dollar rate to intermediate points on three trains is not undue or unreasonable.

The road defends the through rate of $1 to intermediate points on the three trains mentioned [two by the Springfield route and one (3 p. m.) by the Shore Line] because the number of persons taking parlor cars to or from intermediate points is small in comparison with the total number of parlor car passengers. For example: the average number of local parlor car passengers on the train leaving New York at 3 p. m. is only about ten per cent. of the whole number of passengers using parlor car accommodations on that train; therefore, as the parlor cars are patronized chiefly by long distance travelers and the parlor car service primarily maintained for their benefit, it is necessary on some trains to guard against filling up the parlor cars at the terminals with local or short-distance travelers, and thus leaving insufficient accommodations for through or long-distance passengers. It is said that all or nearly all the parlor car seats on these trains are frequently required for the use of through travelers, and that such travelers would often be deprived of desired accommodations if seats were sold at lower rates to intermediate points. The road claims that it is not feasible to increase the parlor cars on the trains in question, because the number now used is as great as can be hauled at the high rate of speed maintained by those trains. Moreover, at both New York and Boston the yards where trains are made up are at considerable distances from the passenger stations, while the physical conditions at those stations are such that additional cars cannot be put in after the trains have been placed at the passenger platforms. As a practical matter, it is insisted, the trains must be made up with reference to their scheduled time and the usual number of passengers carried, and that an increase of parlor car accommodations cannot be provided. In other words, the dollar rate is charged on these trains to all points not for the purpose of added revenue but in the interest of through passengers, who have the greatest need of parlor car accommodations. The evidence sustains defendant's contention in this regard and the facts are found accordingly.

Prospects of the Grand Trunk Pacific.

The following comment was made by Mr. C. M. Hays at the recent half-yearly meeting of the Grand Trunk Company, on the prospects of the Grand Trunk Pacific. He presents the roseate point of view with which the enterprise seems quite generally to be regarded in Canada.

"The Grand Trunk Pacific is going to be in quite a different position from that of an ordinary new enterprise. Here is the Grand Trunk, the parent company, standing with a large traffic, ready to deliver it westbound. It does not have to wait five, ten or fifteen years to build up a traffic; it starts with a traffic right from the beginning, and that is of a most remunerative character—a high-class traffic, consisting of agricultural material, dry goods, boots and shoes, and all that class of merchandise that a new and rapidly developing country requires. The Grand Trunk, as it is to-day, hauls it 200 miles and hands it over to a competitor and gets nothing back. This enterprise which we are advocating combines points and advantages that no other transcontinental line in the United States or Canada can have. The line stretches 1,000 miles through the wheat belt of the country further than any other transcontinental line. It goes through that country on level grades, practically on one-half of 1 per cent. It crosses the mountains at the lowest elevation of any other transcontinental line of the country—2,500 ft. at a maximum by the Pine Pass and 2,200 ft. only by the Peace river—we have not decided which will be adopted—as against an elevation of 8,000 ft. by some of the lower routes.

Then, in addition to the advantages of grade, location and so on, the line will be the shortest one between the East—China and Japan and all of that country to which we must look for our future development; the road is 1,500 miles shorter from Montreal to Yokohama than via New York and San Francisco. It is 500 miles shorter than the Canadian Pacific route to Victoria. In all these great questions arising to-day in connection with Russia, Japan and all that territory, the importance of the shortest route must be apparent to you. There are many of you here to-day who will live to see the Grand Trunk Pacific hauling as much of its grain toward the Pacific for consumption in China, Japan and that territory as will be hauled in this eastern direction. The route will give the Grand Trunk control of the rapidly growing business of the Yukon territory. That traffic all goes down now either by Vancouver, Seattle or the southern coast towns, and there it takes steamer some 2,000 miles. We shall have shortened that distance by rail in that neighborhood by 1,000 miles.

The Grand Trunk is not going to be called upon under its guarantees for one cent for eight years after the construction of the line is commenced, the cost of the line during construction being added to capital, and provided out of capital, and the securities which the Grand Trunk will guarantee will not be issued for eight years, and then, after that eight years have rolled by, you have seven years yet on the mountain section. There can be not the slightest doubt as to what the returns will be from the prairie section, but on the mountain section you have seven years without any claim at all, three years after that only a claim on what is earned, making, therefore before the mountain section becomes anything of a burden on the railroad 18 years. All I have to do is to ask you to look back at meetings and discussions which took place of a similar character in connection with the Canadian Pacific, where it was freely prophesied by gentlemen who were doubters that it would not earn the axle grease. The gentlemen who were fortunate enough to buy the securities from those who held that impression have profited. We are going into the territory which was originally selected as the route of the Canadian Pacific. The surveys were made by the Canadian Government, who spent $3,000,000 in determining and selecting what was the most easy and direct route for a transcontinental line. This route was selected, but a change of government took place just about the time the report was made, and the idea was abandoned. A lower route was taken through a less desirable country than that which we are now taking, so that we are simply confirming the judgment of 15 or 20 years ago as to the desirableness of the route and the character of country we are going through. To my mind it is difficult to conceive that there can be any objection to this scheme, which promises so much to the Grand Trunk, and which links its fortunes with those of the Government of Canada in a way that the two must work together, not only for the benefit of the country at large but for the joint benefit of the country and the Grand Trunk Railroad."

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page 16.)

Franklin Institute.

At a meeting of the Sections held in Philadelphia, April 28, an address on "The Phenomena of Radio-Activity and their Applications," with illustrations, was delivered by Mr. M. I. Wilbert.

American Society of Mechanical Engineers.

There was a meeting in New York of the members of this society on Tuesday, April 26, at which an address was delivered by Professor W. F. M. Goss, of Lafayette, Ind., whose subject was "The Modern Locomotive." A portion of this paper is printed elsewhere in this issue.

Society of Engineers of Eastern New York.

This is the name of a society organized April 21 at Albany, N. Y., with a membership of about 100. The following Board of Governors has been elected: President, H. S. Hammet, of Troy; Vice-President, Professor O. S. Landreth, Union College, Schenectady; J. G. Peck, Albany; A. L. Rohrer, Schenectady; D. S. Kimball, Pittsfield, Mass.; J. A. Capp, Schenectady, and W. I. Slichter, Schenectady. The new board will draw up a constitution and by-laws to be presented at the next meeting, to be held in the autumn. After a short business session, the members listened to a lecture on "Alumino Thermics," by E. Stutz.

PERSONAL.

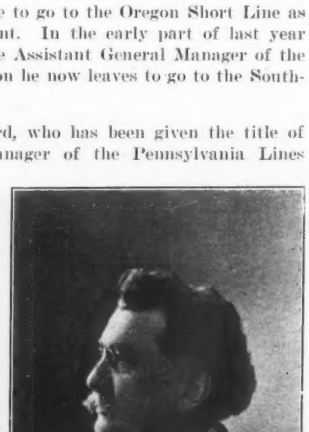
—Mr. Samuel Moody, whose promotion to the General Passenger Agency of the Pennsylvania Company to succeed Mr. Ford, is announced, has been in railroad service since 1885. In that year he began as a traveling passenger agent, and two years later was appointed District Passenger Agent. From that position he was promoted in 1893 to be Assistant General Passenger Agent in Cin-

cinnati. Two years afterward he was transferred to Pittsburg, with the same title, and this position he has since held.

—Mr. J. G. Metcalfe, whose election to the First Vice-Presidency of the National Railroad of Mexico, following the acquisition of a controlling interest in the "National" by the Government of Mexico, began his railroad career as a telegraph operator, later becoming train despatcher, first at Dennison, and then at Logansport, Ind., on the Pittsburg, Cincinnati, Chicago & St. Louis. In 1872 he went to the Louisville & Nashville as chief despatcher, then became Superintendent of Transportation, and, in 1881, Division Superintendent. In 1886 he was made General Manager, which position he held until 1900, when he resigned to take a similar position on the Denver & Rio Grande. In November, the following year, he left the D. & R. G. and became General Manager of the Evansville & Terre Haute. At the time of Mr. Metcalfe's election to the First Vice-Presidency of the National Railroad of Mexico he was President of the Mexican International, which position he had held since 1903.

—Mr. Edgar E. Calvin, who succeeds Mr. Mohler as General Manager of the Southern Pacific lines in Oregon, as well as of the Oregon Railroad & Navigation Company, was born in Indianapolis, Ind., 46 years ago. His railroad service dates from 1873, when he began as a telegraph operator on the Indianapolis, Cincinnati & La Fayette. During the year 1876 he was at school, but in April the next year he took a position on the Union Pacific as operator, and subsequently was station agent, train despatcher and trainmaster. In 1887 he went to the Missouri Pacific and was appointed Division Superintendent; but in 1891 went back to the Union Pacific, as Superintendent of the Idaho Division. Four years later he was made General Superintendent of the International & Great Northern; but, in March 1897, he resigned the Texas place to go to the Oregon Short Line as General Superintendent. In the early part of last year he was promoted to be Assistant General Manager of the O. S. L., which position he now leaves to go to the Southern Pacific.

—Mr. Elias A. Ford, who has been given the title of Passenger Traffic Manager of the Pennsylvania Lines West of Pittsburg, has been at the head of the passenger department of those lines for 23 years, and has been in active railroad service, all of the time in the passenger department, for over 40 years. He is a native of Ohio, and was educated at Hiram (Ohio) College. When a young man Mr. Ford taught school in winter and studied in the summer. He served two years in the army during the War of the Rebellion, and after leaving the army, in 1863, went to work as ticket clerk in the Union Station at Cleveland. For three years, from 1865, he was General Western Passenger Agent of the Cleveland, Columbus & Cincinnati, and was then made General Passenger Agent of the Bellefontaine Railway. On the consolidation of the "Bee Line" road he was appointed General Passenger Agent of the new company, the Cleveland, Columbus, Cincinnati & Indianapolis. In 1871 he went to the Missouri Pacific as General Passenger Agent. In 1876 he became General Passenger Agent of the St. Louis, Iron Mountain & Southern, but three years later went to the Vandalia, where he took a similar position. Since 1881 he has been General Passenger Agent both of the Vandalia and of the Pennsylvania Lines West.



—Mr. W. D. Drake, a well known civil engineer of Cleveland and formerly a member of the firm of Drake & Wiers, railroad supply dealers, died recently at his home in that city. Mr. Drake was born in Portsville, N. Y., in 1837, and in the early fifties was postmaster in Richburg, N. Y. When the Erie Railroad was being built between Meadville and Salamanca, Mr. Drake was connected with it as civil engineer and fuel agent. He went into the railroad supply business about 1879 and continued in it about 20 years. He became a member of the firm of Drake & Wiers, and retired from the firm about five years ago.

—Judge Stevenson Burke, who died at his home in Cleveland, Ohio, on Sunday last, at the age of 78, and who was for many years one of the most prominent lawyers in Ohio, had been connected with various railroads for more than 30 years, and was President of the Cleveland & Mahoning Valley at the time of his death. He took part in railroad litigation as long ago as when the Atlantic & Great Western was in the courts, and he was at one time General Counsel of the Cleveland, Columbus, Cincinnati & Indianapolis. When President of the Hocking Valley, a few years ago, he defended himself successfully against suits involving $8,000,000.

—Mr. John Reilly, for several years President of the United States Metallic Packing Company and the Millwood Coal and Coke Company; also Vice-President and Treasurer of the American Locomotive Sander Company, died at his home in Philadelpha, on April 19. Mr. Reilly was 69 years old. He was born in central Pennsylvania, and represented Blair County in the Forty-fourth Congress. In early life he was connected for over 30 years with the Pennsylvania Railroad, rising to the position of Superintendent of Transportation, which position he held until his resignation in the early eighties.

—Mr. Everett Buckingham, the new General Superintendent of the Oregon Short Line, is about 46 years old. He was born at Leonanon, Boone County, Ind., and began railroad work at the age of 12, as a messenger boy on the St. Joseph & Denver City, now known as the St. Joseph & Grand Island. He was afterward made clerk and car accountant on that road. In 1880 he was made chief clerk in the car accountant's office of the Union Pacific at Omaha, Neb., and two years later was made Car Accountant. For about ten years from 1889, Mr. Buckingham was Superintendent of the U. P., and for the last five years has been Superintendent of Transportation, with office at Omaha.

—Mr. F. C. Stimson, Division Engineer of the Chicago, Rock Island & Pacific at Little Rock, Ark., began his railroad work while still attending school, working as roadmaster's clerk during vacation. His next work was as rear flag on a preliminary surveying party, who were making surveys from Laramie City westward; later he was made Assistant Engineer. Then for a time he was on the Kansas City & Omaha as Assistant Engineer. In 1889 he was appointed Assistant City Engineer at Council Bluffs. The next year he was made Assistant Engineer on the Chicago & North Western in charge of double track work between Clinton and Cedar Rapids. In August, 1897, he was made Assistant Engineer on the North Western and continued in the service of that company until the present month, when he was appointed Division Engineer of the Arkansas Division of the Rock Island.

—Mr. John K. Cowen, former president of the Baltimore & Ohio, died in Chicago on Monday last, at the home of his sister. Mr. Cowen was born in Millersburg, Ohio, in 1844, and was educated in Vermillion Institute, Hayesville, Ohio. For a year he taught school in Millersburg and then went to Princeton University, where he graduated in 1866. Later he studied law in the University of Michigan and was admitted to the bar in Canton, Ohio, in 1868. For four years Mr. Cowen practised his profession in Mansfield, Ohio, and in 1872 he was appointed counsel for the Baltimore & Ohio. In 1876 he was made General Counsel and in 1896 was chosen president of the company. In the reorganization in 1896 he was made one of the receivers of the company. Mr. Cowen's prominence in the railroad world was the result of his energy and his accomplishments in the legal field, but in the duties of the receivership of 1896-1900, which work involved problems of great magnitude in all departments of railroad administration, he developed marked ability as a general managing officer; an ability which was recognized by his election again to the presidency after the close of the receivership. This office he held until the advent of the Pennsylvania interest in the management of the Baltimore & Ohio.

ELECTIONS AND APPOINTMENTS.

American Railway Association.—At the semi-annual meeting, in New York City, April 27, Stuyvesant Fish, President of the Illinois Central, was unanimously elected President of the A. R. A. C. G. Waldo was re-elected Second Vice-President, and Wm. H. Baldwin, Jr., and W. C. Brown were re-elected members of the Executive Committee.

Atchison, Topeka & Santa Fe.—James E. Gorman, hitherto General Freight Agent, has been appointed Assistant Freight Traffic Manager.

Atchison, Topeka & Santa Fe (Coast Lines).—S. L. Bean, hitherto Master Mechanic at Albuquerque, N. Mex., has been appointed Mechanical Superintendent, with headquarters at Los Angeles, Cal., succeeding G. R. Joughins.

Atlantic & Birmingham.—The headquarters of Alex. Bonnyman, Superintendent, have been removed from Waycross, Ga., to Brunswick, Ga.

Baltimore & Ohio.—P. H. Cassidy has been appointed Superintendent of the New York Terminals, with headquarters at St. George, Staten Island, succeeding C. E. Burr, resigned. Mr. Cassidy is also appointed Superintendent of the Staten Island Rapid Transit Railway.

Bloomsburg & Sullivan.—At a meeting held recently Samuel Wigfall was elected President; Henry T. Dechert, Vice-President, and H. J. Conner, Secretary and Treasurer.

Boston & Albany.—John Howard, hitherto Division Superintendent of Motive Power of the Western Division of the New York Central & Hudson River, has been appointed Superintendent of Motive Power and Rolling Stock of the B. & A., with headquarters in Boston, Mass., succeeding T. B. Purves, Jr., resigned, effective May 1. (See New York Central & Hudson River.)

Canadian Pacific.—E. H. McHenry, Chief Engineer, with headquarters at Montreal, Que., has resigned.

Colorado Springs & Cripple Creek.—S. J. Henry, Traffic Manager, has resigned.

Chicago, Rock Island & Pacific.—William Wright has been appointed Superintendent of Motive Power, with headquarters at East Moline, Ill.

Duluth, Missabe & Northern.—The office of J. W. Kreitter, Superintendent, has been removed from Duluth to Proctor, Minn.

Lehigh Valley.—The statement that Mr. Thos. O. Cole, Superintendent of Car Service, had resigned, is denied by the Chief Officer of the operating department.

New York Central & Hudson River.—C. H. Hogan, hitherto Master Mechanic of the Western Division, has been appointed Division Superintendent of Motive Power of the Western Division, with headquarters at Depew, N. Y., succeeding John Howard. William Smith has been appointed to succeed Mr. Hogan at E. Buffalo, N. Y., effective May 1. (See Boston & Albany.)

Norfolk & Southern.—The President of this company is A. H. Flint, who has been elected in place of John Carstensen, Fourth Vice-President of the New York Central, but the latter will remain a director. Henry Sproul has succeeded Alfred Skitt as Vice-President. William S. Langford has been chosen Secretary and Assistant Treasurer and Mr. Chaplin has been made Treasurer. Messrs. Flint, Sproul, Chaplin (President of the Colonial Trust Co. of Pittsburg) and J. T. Bacon, of Flint, Bacon & Co., have been elected Directors, succeeding Chauncey M. Depew, Charles F. Cox, E. V. W. Rossiter and George R. Turnbull, resigned.

Pennsylvania Lines West.—E. A. Ford, hitherto General Passenger Agent, has been appointed Passenger Traffic Manager. Samuel Moody, hitherto Assistant General Passenger Agent, has been appointed to succeed Mr. Ford.

Staten Island Rapid Transit.—George J. Brown is appointed Auditor and General Traffic Agent, with headquarters at New York, succeeding P. H. Cassidy. (See Baltimore & Ohio.)

Texas Southern.—G. J. Pollock has been elected Second Vice-President, with office St. Louis, Mo.

Toledo, St. Louis & Western.—F. McArdle has been appointed Assistant Superintendent, with headquarters at Frankfort, Ind.

LOCOMOTIVE BUILDING.

The El Paso & Northeastern is having ten locomotives built at the Baldwin Locomotive Works.

The Central Northern Ry. of Argentine is reported in the market for 12 locomotives. (See cars.)

The Chicago, Burlington & Quincy is asking bids on 40 Prairie type (2-6-2) and 10 Atlantic type (4-4-2) passenger locomotives.

The Chicago, Lake Shore & Eastern has ordered eight switching and four Consolidation locomotives from the American Locomotive Company.

The Illinois Central has ordered 30 Consolidation (2-8-0) locomotives from the American Locomotive Company and five Atlantic type (4-4-2) locomotives from the Rogers Locomotive Works.

The Grand Trunk has ordered five simple passenger locomotives from the American Locomotive Co., for April and May delivery. The tank capacity of these locomotives will be 7,000 gallons of water, and coal capacity 10 tons.

CAR BUILDING.

The Maine Central is having 200 freight cars built at the Laconia Car Works.

The New York Central & Hudson River is reported in the market for 500 flat cars.

The Illinois Central is considering the purchase of a number of steel coal cars.

The Chicago, Burlington & Quincy is about to purchase four 70-ft. dining cars.

The Missouri, Kansas & Texas is reported in the market for about 500 freight cars.

The Lake Shore & Michigan Southern is reported in the market for 1,000 steel coal cars.

The St. Louis, Brownsville & Mexico has ordered eight tank cars from the American Car & Foundry Co.

The Black Lick Mining Co., Philadelphia, is reported to have ordered 200 steel coal cars from the Standard Steel Car Co.

The Big Bend Coal Mining Co., Philadelphia, has ordered 100 steel coal cars of 100,000 lbs. capacity from the Standard Steel Car Co.

The Commercial Coal Mining Co., Philadelphia, has ordered 300 steel coal cars of 100,000 lbs. capacity, from the Standard Steel Car Co.

The Vandalia has ordered 11 cabooses from the American Car & Foundry Co. These cabooses will be 30 ft. 1½ in. long and 9 ft. 1½ in. wide.

The Central Northern Ry. of Argentine is reported in the market for 200 cars. The principal office is at 284 Calle de Mayo, Tucuman, Argentine Republic.

The Chicago, Milwaukee & St. Paul is considering the purchase of a number of passenger coaches in addition to the order recently placed with Barney & Smith.

The Buenos Aires Grand National Tramway Co., Ltd., is reported in the market for a large number of cars. This company is about to replace its horse car system with electricity.

The Temiskaming & Northern Ontario has ordered three first class and four second class passenger coaches and two combination baggage, mail and express cars from the Crossen Car Mfg. Co., of Cobourg, Ont.

The Pittsburg, Shawmut & Northern, as reported in our issue of March 18, is having 800 box cars of 60,000 lbs. capacity built at the Berwick Works of the American Car & Foundry Co. The cars will be 36 ft. long, 9 ft. 1 in. wide, and 7 ft. 6 in. high. Special equipment includes: steel axles, Simplex bolsters, Monarch brake-beams and couplers, Dunham door fastenings and doors, Sherwin-Williams paint, Winslow roofs, Simplex trucks, and American Car & Foundry Co.'s wheels.

The Chihuahua & Pacific, as reported in our issue of April 22, has ordered 60 flat cars of 60,000 lbs. capacity from the American Car & Foundry Co. for May 14, 1904, delivery. These cars will weigh approximately 23,000 lbs., and will be 36 ft. long, and 8 ft. 9 in. wide. The special equipment includes: Sterlingworth brake-beams, cast-iron brake-shoes, Standard Coupler Co.'s couplers, Pittsburg Spring & Wire Co.'s springs, Westinghouse air-brakes, Lake Shore standard diamond-frame trucks, Prince's mineral brown paint, American continuous draft-rigging, American Car & Foundry Co.'s wheels, and M. C. B. standard 33-in. wheels.

BRIDGE BUILDING.

ALABAMA.—Both Houses of Congress have passed a bill authorizing the counties of Dale and Houston, Alabama, to build a bridge over the Choctawhatchee river.

ALGONA, IOWA.—Bids are wanted, May 3, by L. E. Potter, County Auditor, for building a steel bridge, 50 ft. long and 16 ft. wide, over Lott's Creek.

ATHENS, TENN.—McMinn County will build a steel bridge over Eastrand Creek.

BANGOR, ME.—A resolution has been passed by the Common Council and Board of Aldermen authorizing the city officials to ask bids for building the iron swing bridge over Kanduskeag Stream at Water street, to cost about $60,000; also for two spans for the Bangor toll bridge. (See Construction Supplement.)

BAYONNE, N. J.—The House of Representatives on April 21 passed a bill authorizing Hudson and Union counties, New Jersey, to build a bridge with a draw over Newark Bay, between Bayonne and Elizabeth, N. J.

BOSTON, MASS.—The committee on metropolitan affairs has reported a bill which provides for the rebuilding of the Boylston Bridge over the Charles River, between Boston and Cambridge.

BRIGHTON, P. E. I.—Residents are agitating the question of building a bridge over North River, the cost of which will vary from $150,000 to $175,000.

CHICAGO, ILL.—A contract has been awarded to the Jackson & Corbett Co. at $154,900 for building the Harrison street bridge. The other bids were: Chicago Bridge & Iron Co., $157,800; Roenheld & Gallery, $161,500; American Bridge Co., $164,000; C. L. Strobel, $173,500; Ritter Connelly Mfg. Co., $193,100. (See Construction Supplement.)

CHICOPEE, MASS.—There is a bill in the legislature to authorize the building of a bridge across the Connecticut river between Chicopee and West Springfield, to cost not over $150,000. The bill apportions the expense: to Chicopee, 45 per cent.; to West Springfield, 20 per cent., and to Hampden County, 35 per cent.

CLINTON, ILL.—A bridge to cost about $8,000 will be built by the Board of Supervisors over the Iron River.

COWANSVILLE, QUE.—Bids will be received by J. P. Steinhour, Secretary-Treasurer, City Hall, Montreal, for building a steel and iron bridge over the south branch of the Yamaska river.

FAYETTEVILLE, PA.—The Chambersburg & Gettysburg Electric Railway Company is having plans made for a bridge over the Cumberland Valley tracks at West Fayetteville, to cost $10,000.

FLORIDA.—The United States Senate on April 23 passed a bill authorizing a bridge over St. Andrew's Bay, near Grassy Point, Fla.

FRENCH LICK, IND.—Bids are wanted, May 5, by Geo. W. Tegardeu, Paoli, Ind., for building a steel bridge 90 ft. long over French Lick Creek, in Orange County, and for some other bridge work.

GUADALAJARA, MEX.—The local government is again considering the question of building an arch bridge over the San Juan River.

HAMMOND, IND.—Both Houses of Congress have passed a bill extending the time for the completion of the bridge for the New York, Chicago & St. Louis and the Chicago & Erie over the Calumet river, at Hammond, Ind., to July 1, 1905.

HICKMAN, KY.—Bids will soon be asked for building a highway bridge 285 ft. long and 16 ft. wide.

JERSEY CITY, N. J.—Bids are wanted, May 5, by the Board of Chosen Freeholders of Hudson County for building a steel bridge over the Newark & New York R. R. tracks at Arlington avenue. John P. Egan is Clerk.

KINSTON, N. C.—A bridge with 110-ft. steel draw to cost about $5,500 is to be built over the Neuse River.

LEBANON, PA.—The Lebanon County Commissioners are planning to replace the wooden bridge in East Hanover Township over the Swatara Creek with a structure to cost about $20,000.

LEXINGTON, MO.—Both Houses of Congress last week passed the bill authorizing a combined wagon and electric railroad bridge over the Missouri River, at Lexington, Mo.

MARYSVILLE, CAL.—Surveyor Meek has submitted a plan to the Board of Supervisors for a steel bridge over Simmerly Slough, to have a 100-ft. span with 16-ft. roadway.

MINNESOTA.—Both Houses of Congress have passed the bill authorizing Itasca County, Minn., to build a bridge over the Mississippi River.

MILWAUKEE, WIS.—This city, it is reported, has decided that the Chicago & North Western must elevate its tracks on the Madison Division entering the city. The cost of the work will be about $800,000.

MOSS POINT, MISS.—Permission has been granted to Denny & Co., of this place, to build a bridge over the Escatauba River.

MT. GILEAD, OHIO.—Morrow County has $25,000 for bridge work and will soon build bridges at Wykers, in Harmony Township, at Johnsville, Mt. Gilead, Edison and Cardington.

MUNFORDVILLE, KY.—Hart County Fiscal Court has appropriated $44,000 to build a bridge over Green River at this place and to buy the bridge over the same river at Rio.

NEWARK, N. J.—The bids opened April 19 at the office of the Essex County Park Commission for building two concrete steel arches were as follows: Park avenue bridge, complete, with 1,500-ft. pile foundation—American Concrete Steel Co., Newark, N. J., $124,136; John Gunn, E. Orange, N. J., $116,677; Commonwealth Roofing Co., Newark, N. J., $111,291; Patrick McGovern, Boston, Mass., $98,650; James A. Hart Co., New York City, $97,775; the B. M. & J. F. Shanley Co., Jersey City, N. J., $92,400; Lloyd-Collis Co., Inc., New York City, $85,000, and the Eastern Construction Co., Jersey City, N. J., $84,000. Bloomfield avenue bridge, for the complete structure, with 10,000 ft. of pile foundation—John Gunn, $54,581; American Concrete Steel Co., $52,255; James A. Hart Co., $52,142; D. Cuozzo & Co., New York City, $46,500; Patrick McGovern, $46,500; Commonwealth Roofing Co., $44,945; Russell Contracting Co., New York City, $42,931; Lloyd-Collis Co., $42,500; the B. M. & J. F. Shanley Co., $40,500; Eastern Construction Co., $40,500; Tucker & Vinton, Inc., New York City, $39,200; Cement Paving & Construction Co., Jersey City, N. J., $34,547, and the Schillinger Bros. Co., Chicago, Ill., $33,797. A. M. Reynolds Jr., is Engineer. (March 25, p. 247.)

NEW ORLEANS, LA.—The Public Works Department has reported about 200 bridges to be repaired.

NEWPORT, KY.—The Central R. R. bridge, to be sold May 21 by Master Commissioner Thomas Healer, has been appraised at $800,000.

NEW YORK, N. Y.—The United States Senate on April 26, passed the bill authorizing the Spuyten Duyvil & Port Morris Railroad to build a bridge over Spuyten Duyvil Creek and Harlem River, north of the Harlem River pier.

OREGON, MO.—Bids are wanted May 5 by C. S. Armstrong, Road and Bridge Commissioner, for building a large number of bridges in Holt County.

OSHKOSH, WIS.—The Bridge Committee and Board of Public Works are having plans made for the building of the new bridge at Main street. Bonds may be issued by the city for the cost of the work, which will be about $100,000.

PETERSBURG, IND.—Bonds to the amount of $22,000 have been issued by Knox County to replace bridges destroyed by floods.

PHILADELPHIA, PA.—An ordinance will be introduced providing for an appropriation of $250,000 to build a stone and iron bridge 480 ft. long with a center span of 109 ft. over Wissahickon Creek, on Walnut lane, to connect Germantown with Roxboro.

An ordinance has been introduced in the City Council which provides for an appropriation of $150,000 for finishing the Thirty-third street bridge over the Pennsylvania and Philadelphia & Reading tracks.

REDDING, CAL.—The Merchants' Club of this town has appointed a committee to urge the building of a steel bridge over the Sacramento River.

ROCHESTER, N. Y.—The New York Central has been authorized by the Common Council to replace its wooden bridges over Moore, Orchard and Magne streets with steel structures.

ROCKVILLE, IND.—Bids are wanted, May 12, by the Board of County Commissioners, for building a bridge over Mill Creek 80 ft. long and 16 ft. wide; also for two other bridges each 130 ft. long and 16 ft. wide of either steel or cement construction.

ST. CATHERINES, ONT.—A steel bridge will be built at Queenston street.

ST. JACOBS, ONT.—Bids are wanted, May 3, by John L. Wideman, Clerk of the Council, for building a steel bridge over the Grand river at Conestoga, 310 ft. long; two spans, with concrete abutments. Also for a steel bridge 300 ft. long over the Grand river near Winterburne.

ST. LOUIS, MO.—A proposition will be submitted to the voters at the fall election to authorize the expenditure of $2,000,000 for building a viaduct 3,000 ft. long over the railroad tracks and to open the boulevard so as to run from one end of the city to the other.

SAVANNAH, MO.—Bids are wanted, May 6, by J. E. Schnitzuis, Road and Bridge Commissioner, for building five steel bridges, repairing a number of steel culverts and repairs to about 40 other bridges in Andrew County.

SEVIERVILLE, TENN.—Sevier County will build a steel bridge over Pigeon River.

SHREVEPORT, LA.—A bill authorizing the Shreveport Bridge & Terminal Co. to build a bridge over the Red River was passed by the House of Representatives on April 21 and by the United States Senate on April 22.

SOUTH BEND, IND.—Bids are wanted, May 21, by the Commissioners of St. Joseph County for a concrete bridge 102 ft. long at South Bend; also for an iron bridge at Crums Point 45 ft. long with 16-ft. roadway. Jno. W. Harbon is Auditor.

TILSONBURG, ONT.—Elgin County Council has decided to replace the wooden bridge near Richmond with a steel structure and to build a steel bridge with concrete abutments at Port Burwell.

TOPEKA, KAN.—The Chicago, Rock Island & Pacific, it is reported, is making plans to rebuild its bridge over the Kaw River at a cost of about $50,000.

TORONTO, ONT.—The Temiskaming & Northern has awarded a contract to the Dominion Bridge Co., at $20,000, for building bridges over the Montreal river.

VESTAL, N. Y.—Petitions for a highway bridge over the Susquehanna River have been made by residents of the towns of Vestal and Union.

WAPAKONETA, OHIO.—Auglaize County will issue $25,000 bonds to replace bridges destroyed by floods.

WAREHOUSE POINT, CONN.—The New York, New Haven & Hartford has awarded a contract for enlarging the abutments and piers of its bridge over the Connecticut River at Warehouse Point, to accommodate a second track. The award for the steel work has not yet been made.

WAWANESA, MAN.—Bids are being received by W. T. Johnson for building a steel bridge over the Souris river.

YANKTON, S. DAK.—Bids are wanted at once by H. Leone Miller, Oak, Neb., for building a combined railroad and highway bridge of steel, to be about 2,000 ft. long, on concrete piers, over the Missouri River, for the Winnipeg, Yankton & Gulf R. R., at a cost of about $750,000.

Other Structures.

BEAUMONT, TEXAS.—The new passenger station to be built by the Southern Pacific in Beaumont will be 65 ft. x 250 ft., with train sheds about 600 ft. long. The total cost of the improvements will be in the neighborhood of $75,000.

BELLEVILLE, ILL.—The Harrison Machine Works is preparing to build a machine and engine shop in addition to its other buildings.

CHARLEROI, PA.—The Pennsylvania (Monongahela Division), it is reported, will build a passenger station, to cost about $30,000.

CHICAGO, ILL.—The Chicago & Western Indiana, it is reported, will build new brick passenger stations at Fifty-ninth and Sixty-eighth streets, at a cost of about $45,000.

DEMING, N. MEX.—The passenger station of the Southern Pacific, recently destroyed by fire, is to be rebuilt.

EL PASO, TEX.—The Miners' Foundry & Machine Products Mfg. Co. has secured ground on which it will build a brick foundry, 65 x 186 ft. A machine shop and other buildings will also be put up, requiring new machinery.

ENOLA, PA.—The H. S. Kerbaugh Co., which holds large contracts from the Pennsylvania, will build a repair plant, 136 ft. x 200 ft., to contain a carpenter shop, boiler shop and a blacksmith shop.

MINNEAPOLIS, MINN.—The Minneapolis, St. Paul & Sault Ste. Marie, it is reported, will build a six-stall roundhouse of brick, to cost about $13,000.

NEW ORLEANS, LA.—The New Orleans Terminal Company, which represents interests of the Rock Island and the Southern, has submitted plans for extensive terminal improvements at New Orleans, which include a new station, a warehouse and a freight terminal.

NEWTON, MISS.—The Railroad Commission will be petitioned by residents to compel the Mobile, Jackson & Kansas City to build a passenger station.

NEW VILLAGE, N. J.—The Delaware, Lackawanna & Western, it is reported, is making plans for building a new concrete passenger station, 20 ft. x 70 ft.

NIAGARA FALLS, N. Y.—The Central Machine Co. will put up a building, 60 x 120 ft., to cost about $10,000, for its new works.

SEDALIA, MO.—The Missouri Pacific, it is reported, is receiving bids for its new shops to be built at Sedalia.

SYRACUSE, N. Y.—The Syracuse Rapid Transit Railway, it is reported, will build two car barns, one 40 ft. x 295 ft., and the other 93 ft. x 350 ft., at a cost of $50,000.

TOYAH, TEX.—The Texas & Pacific, it is reported, will rebuild its roundhouse, recently destroyed by fire.

U. S. NAVY.—Bids were opened at the Navy Department on April 23 for a shipfitters' shop at the Charlestown Navy Yard, the bids ranging from $145,000 to $184,420; for a building for the storage of steel at the Puget Sound Navy Yard, the bids ranging from $30,726 to $40,659, and for a boat shop at the same yard, the bids ranging from $165,000 to $182,762.

WESTFIELD, N. Y.—The Lake Shore & Michigan Southern and the Jamestown, Chautauqua & Lake Erie roads are making plans to jointly build a new stone and brick passenger station.

WHEELING, W. VA.—The Warwood Tool Company, of Wheeling, is making plans to put up a steel frame building, 60 x 450 ft., for its new works at Glennova. Bids will soon be asked for the necessary machinery.

WINNIPEG, MAN.—The Canadian Northern is having plans made for improvements, which include new shops, a hotel and a station.

YORK, PA.—The Northern Central, it is reported, has plans ready for building a new passenger station on Market street.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ARLINGTON & PACIFIC COAST.—It is stated that this company, which was recently incorporated, will build a railroad from Arlington, Ore., to The Dalles, 110 miles, passing through Condon, Fossil and Rock Creek. Surveys are now in progress between Condon and Fossil, 20 miles, and between Rock Creek and The Dalles, 50 miles. It is stated that grading will be begun about July 1. J. E. Simmons is President; M. M. Shillock, Secretary, and J. P. Finley, Treasurer, all of Portland, Ore.

Atchison, Topeka & Santa Fe.—Plans are reported completed for extensive improvements on the freight terminals of this road at Kansas City. The Santa Fe now has 67 miles of terminal tracks in and about Kansas City, and it is stated that this will be increased to 97 miles. A large gravity yard will be built in this city, and a number of storage and switching tracks will be laid between Argentine and Turner.

Baltimore & Ohio.—The Engineering Department of this company has completed the programme for its work during 1904. It will consist almost entirely in the enlargement of yards, and the extension of second, third and fourth tracks at various points on the Pittsburg Division. The work has already begun at many places. The new yard at Demmler, Pa., is nearing completion, and the work on third and fourth tracks on the Wheeling Division and between Pittsburg and McKeesport is progressing. The proposed new line from Pittsburg to Ellwood City will not be built at present, as the plans are not yet fully completed. The heaviest work will be west of Youngstown, Ohio, where the old line is being entirely rebuilt.

Bee Tree.—The contract for building this proposed road from Swannanoa, N. C., to Craggy Mountain, eight miles, has been let to J. H. Hemphill & Co., of Marion. Work will be begun at once and it is stated that grading will be completed by July 1. S. F. Chapman, Asheville, N. C., is said to be interested. (April 22, p. 314.)

Boston & Albany.—Work will be begun at once on rock ballasting of the road between Palmer and Warren, 10 miles; Westfield and Hinsdale, 33 miles, and Chatham and Albany, 23 miles.

California Northwestern.—Work will soon be begun on the reconstruction of the Donahue branch of this company, which runs from Petaluma, Cal., through Lakeville to Donahue, 6½ miles. The entire line will be rebuilt and the work will include a new wharf at Donahue. F. K. Zook, Tiburon, Cal., is Chief Engineer.

Chicago, Anamosa & Northwestern.—A contract is reported let for building this road from Anamosa, Iowa, northwest to Prairiesburg, 10 miles. The line will eventually be extended to a point in Delaware County. Connection will be made at Anamosa with the Chicago & North-Western and the Chicago, Milwaukee & St. Paul. Peter Kiene, Dubuque, Iowa, may be addressed. (See Construction Supplement.)

Colorado, Oklahoma & Southwestern.—The proposed route of this road is from Weatherford, Okla. T., northwest, through Independence, Putnam, Lenora and Mutual to Woodward, 100 miles. Location surveys are in progress and contracts for grading will be let as soon as the location is completed. The headquarters of the company for the present will be at Weatherford. P. A. McCarthy is Chief Engineer. (April 1, p. 264.)

Deepwater Railroad.—Bids are now being asked by this company for the grading and masonry work on an extension 25 miles long in Mercer and Wyoming counties in West Virginia. The contracts for this work will be let some time in May. W. P. Taft, Principal Assistant Engineer, Beckley, W. Va., may be addressed. (See Construction Supplement.)

Denver, Enid & Gulf.—Press reports state that this company is now making surveys for an extension from Guthrie, Okla. T., southeast to Texarkana, Ark., 215 miles. An extension is also proposed from Enid, Okla. T., northwest to Hays, Kan., 170 miles. The road at present runs between Enid and Guthrie, 57 miles. E. I. Peckam, Enid, Okla. T., is Vice-President and General Manager. (April 1, p. 264.)

East Tennessee & Western North Carolina.—It is officially announced that work will be begun at once preparatory to changing this road from narrow to standard gage. The line extends from Johnson City, Tenn., to Cranberry, N. C., 34 miles. G. W. Hardin, Johnson City, Tenn., is General Superintendent.

Fort Wayne & Springfield.—Press reports state that this company has decided to extend its line from Decatur to Portland, Ind., passing through Berne, Geneva and Bryant, and paralleling the Grand Rapids & Indiana between these points. Surveys for this proposed extension will be begun at once, and the work will be started as soon as the line now building between Fort Wayne and Decatur is completed.

Grand Valley, Colorado River & South Pacific.—An officer writes that surveys will be begun on May 1 for a line from Grand Junction, Colo., to the head of the Colorado River, 180 miles. Contracts for grading will be let as soon as the surveys are completed. The road is projected for a distance of 1,250 miles, running through the States of Colorado, Arizona and Utah, but the section out of Grand Junction will be built first. G. R. Propper, Basin, Utah, is President, and C. W. Haskell, Grand Junction, Colo., is Chief Engineer. (April 8, p. 282.)

Gray's Peak R. R.—This company has been incorporated in Colorado to build three lines from Silver Plume, one around Leavenworth to the base of Gray's Peak, another to Keystone and a third to Minturn, in Eagle county. C. J. Morley, Thomas Fielding and Nathan Gregg, Jr., of Denver, Colo., are incorporators.

Gulf, Hutchinson & Northwestern.—This is the new name of the Hutchinson & Southeastern. An amendment to the charter has been filed providing for the building of a line from Hutchinson, Kan., northwest to Oberlin, 200 miles, and it is stated that surveys for this line will shortly be begun. Eugene Tilleaux, Hutchinson, Kan., is President, and George W. Winans is Secretary and Treasurer.

Harriman & Oliver Springs.—A charter has been granted this company in Tennessee. It is proposed to build from Harriman in an easterly direction through Webster and thence in a northerly direction through Poplar Creek Valley to Oliver Springs, 15 miles. The incorporators include J. E. Rhodes, S. P. Sparks, S. C. Brown and others.

Hutchinson & Southeastern.—See Gulf, Hutchinson & Northwestern above.

Illinois, Iowa & Minnesota.—Press reports state that grading is practically completed on this road between Aurora, Ill., and DeKalb. The road is projected from a point on Lake Michigan through Michigan City, Valparaiso, Momence, Joliet, Aurora and DeKalb to Rockford, Ill. H. W. Seaman is President and I. W. Troxel, Aurora, Ill., is Chief Engineer. (April 15, p. 298.)

Interstate.—It is reported that the Interstate Construction Company, has been organized to build this proposed railroad from Kansas City, Mo., to Duluth, Minn., with several branches, aggregating a total length of 1,600 miles. J. H. Pickering, Kansas City, is President. (April 22, p. 314.)

Lackawanna & Wyoming Valley (Electric).—The newspapers say that bids are now being asked by this company for building a tunnel about 4,000 ft. long from the south side of Scranton to the present station at Mattes street. J. F. Huggans, Scranton, Pa., is Chief Engineer. (See Construction Supplement.)

Manitoba & Southwestern (Canadian Pacific).—This company has been authorized to build a branch line from Shebo, Manitoba, in a westerly direction and from Church Bridge to Cut Arm Creek.

Melita, Regina & Edmonton.—Application is now being made to the Dominion Parliament for an act to incorporate this company, with power to build a railroad from Melita, Man., northwest to Regina and thence in a northerly direction to a point near the South Saskatchewan River and eventually to Edmonton. The names of the promoters are not stated.

Nevada County Narrow Gage.—It is reported that this company will soon begin work on a cut-off from Colfax, the southern terminus of the line, to Grass Valley, Cal. It is proposed to run the new line south of the present route, commencing at Chicago Park and continuing to Dutch Flat Road, where the old track will be rejoined. C. P. Lughridge, Grass Valley, Cal., is General Manager.

North Dakota Roads.—Press reports state that as soon as the weather permits work will be begun on a line eight miles long connecting the mines of the Pembina-Portland Cement Company with the Great Northern at Hensal, N. Dak. It is stated that a line will eventually be built to Red Lake Falls, Minn., to connect with the extension which is being built north from Glenwood, Minn., by the Minneapolis, St. Paul & Sault Ste. Marie.

Ottawa River.—This company has been chartered in Canada to build a railroad from Montreal to a point on Georgian Bay between Midland and Parry Sound. W. D. Hogg, Ottawa, and J. A. Eithier and E. McMillan, Montreal, are incorporators.

Paragould & Memphis.—It is officially announced that this company will begin work at once on an extension from Manila, Ark., to Osceola, 20 miles. Rights of way have been secured and surveys are practically completed. The road runs at present from Manila, Ark., to Cardwell, Mo., a distance of 20 miles. J. E. Thomas, Cardwell, Mo., is President. (See Construction Supplement.)

Pennsylvania.—It is stated that this company will enlarge its yards at Olean, N. Y., this year by adding about 15 miles of track.

Pittsburg, Summerville & Clarion.—An officer writes that eight miles of this road have been graded out of Summerville, Pa. The line has been surveyed from Summerville to Clarion, 16 miles, and a branch from Strattonville to Mill Creek, four miles, is now being surveyed. Bennett & Nolan, Reynoldsville, Pa., are the contractors and C. F. Heidrick is President. (See Construction Supplement.)

Pontiac & Interprovincial.—The articles of incorporation of this company have been amended, reducing the capital from one million to $600,000. This line is projected from Waltham, Que., to Fergurson's Point, and thence crossing the Ottawa River to Pettewawa and Chalk River to a point on Allumette Island opposite Pembroke, with a branch line to Chapeau.

Port Angeles & Eastern.—Work will be begun in 30 days on this railroad which is projected from Port Angeles, Wash., in a southeasterly direction. The line is already graded for several miles out of Port Angeles. W. W. Belvin will be in charge of the work.

Seaboard Air Line.—The contract for trestle work on the new line near Leeds, Ala., is reported let to Baxler, Wall & Co., of Roanoke, Va. Grading is practically completed on this line, and it is stated that track laying will soon be begun.

Suffolk & Carolina.—An officer writes that this road, which has heretofore been operated as a narrow gage line from Suffolk, Va., to Edmonton, N. C., 50 miles, has now been made standard gage and entirely relaid with 60-lb. rails. An extension to Elizabeth City, N. C., 25 miles, has also been completed and is now in operation. George L. Barton, Suffolk, Va., is General Manager. The *Baltimore Sun* says: "The net earnings for the month of March on the narrow gage line, 50 miles, were at the rate of $67,000 per annum. The road, as extended to Elizabeth City, has a fixed charge of only $35,000 per annum. It is expected that the increase of 25 miles and the broad gaging of the line will more than double its gross and net earnings. The Elizabeth City extension passes over the celebrated Dismal Swamp and opens up some of the finest timber and trucking lands in North Carolina."

Texas Roads.—A company is to be organized to build a railroad from Cotulla, Tex., west along the Nueces River to Carrizo Springs, 40 miles. Connection will be made with the International & Great Northern at the former point. The work will include one large trestle, with several smaller bridges. The Nueces Valley, through which this line will run, is very fertile, but is without railroad facilities. (Official) William H. Davis, Carrizo Springs, Tex., may be addressed. (April 15, p. 298.)

Toledo & Jackson (Electric).—Surveys are now being made and rights of way are being secured for this proposed electric railroad from Jackson, Mich., to Petersburg, 48 miles. At Petersburg, the line will connect with the Ohio & Michigan Electric railroad and will enter Toledo over the tracks of that line. S. A. Foster, Toledo, Ohio, is said to be interested.

Tonopah.—This company has finished its line between Sodaville and Coaldale, Nev., 25 miles, and this section was opened for traffic on April 17. Track laying on the remaining portion is now in progress and grading is completed to within eight miles of Tonopah. The road is being built from Rhodes, Nev., to Tonopah, 65 miles. McClain & McSweeney are the contractors. The company is capitalized at $1,500,000, divided as follows: $1,000,000 of common stock and $500,000 of 6 per cent. 15-year gold bonds. These bonds are guaranteed by the Tonopah Mining Company, and are being issued to pay for the work as it progresses. The common stock has not been issued, but will remain in the treasury of the Tonopah Railroad for the benefit of the Tonopah Mining Company and its stockholders. (March 25, p. 248.)

Valdez & Northern.—Incorporation has been granted this company to build a railroad from Valdez, Alaska, along the Lowe River, through Keystone Canon to the summit of the Coast Range Mountains and thence along Copper River to Eagle City, on the Yukon, approximately 413 miles. Alfred B. Iles, Valdez, Alaska, is interested.

Western Maryland.—This company has announced that it will build extensions of its line from York, Pa., to Northbrook, one mile, and from York to Louck's Mill, two miles. Rights of way are now being secured, and surveys will soon be begun. This work is in connection with the Tidewater extension which this company is now building at Baltimore, Md.

GENERAL RAILROAD NEWS.

Boston & Worcester Street Ry.—The Massachusetts Railroad Commission has authorized this company to issue $200,000 4 per cent., 20-year gold bonds and $100,000 additional stock. The proceeds from the sale will be used to pay for improvements.

Brunswick & Birmingham.—This road has been placed in the hands of a receiver on the petition of E. C. Machen, formerly President of the road, stating that the road is indebted to him for the sum of $5,000 for services rendered. J. R. L. Smith, Macon, Ga., has been appointed temporary receiver. The hearing as to a permanent receivership will be held on May 2.

Carrabelle, Tallahassee & Georgia.—This road, which runs from Carrabelle, Fla., to Tallahassee, 50 miles, was sold on April 22. The name of the purchaser is not stated, but it is reported to be the Georgia, Florida & Alabama R. R.

Chicago Great Western.—This company has filed with the Secretary of State a certificate of increase of its capital stock of $30,000,000 to $50,000,000. It is stated that a large part of the proceeds from the sale of the new stock will be used to pay for the line which this company is about to build from DeKalb to Peoria, Ill.

East Jersey Street.—Incorporation has been granted this company in New Jersey with an authorized capital of $500,000. The new company will take over the East Jersey Traction, Raritan Traction and the Perth Amboy railroad companies. The president of the new company is Frank Berger, of Elizabeth, who is General Counsel for the Public Service Corporation.

Metropolitan Street Railway (New York).—Kuhn, Loeb & Co. have purchased $2,250,000 Central Crosstown Railroad Company's two-year 5 per cent. notes secured by the bonds of that company and guaranteed by the Metropolitan Street Railway Company. It is said that the proceeds from the sale of these notes will be used to reimburse the Metropolitan Securities Company for funds advanced to equip the Central Crosstown railroad with electric power.

New York & Rockaway Beach.—At a meeting of the stockholders of this company on April 26, the lease of this road to the Long Island for a period of 50 years was ratified. The road has heretofore been leased from year to year.

Norfolk & Southern.—The control of this company has been sold to the Chesapeake Transit Company, which operates a number of electric lines connecting Norfolk, Va., Cape Henry and Virginia Beach. It is stated that the line between Norfolk and Cape Henry, 27 miles, and also the branch running from Kempsville to Munden Point, 22 miles, will be equipped with electricity. The remaining portion of the Norfolk & Southern, which runs between Norfolk and Bellehaven, Va., 113 miles, will be operated, as formerly, with steam power.

Pere Marquette.—This company has changed its passenger terminal at Chicago. The tracks of the Pennsylvania are now used from Clarke Junction by way of South Chicago, Englewood and Sixteenth street, where the tracks of the Chicago Terminal Transfer Company will be used into the Grand Central station at Harrison street and Fifth avenue. Heretofore the company has entered the city over the tracks of the Lake Shore & Michigan Southern from Porter to Clarke Junction, 16 miles, and thence by the tracks of the Terminal Company. The change reduces the distance nine miles. After May 1, the through trains will make the run between Grand Rapids and Chicago in 4 h. 45 min., instead of 5 h. 30 min. A new train will be put on which will leave both terminals at noon and arrive at 4:45 p. m. It is stated that by June 15 a new Chicago-Harbor Springs express will be put on.

Raleigh & Pamlico Sound.—This company has filed a mortgage with the Knickerbocker Trust Company, of New York, as trustee, to secure an issue of $1,530,000 5 per cent., 30-year gold bonds. The proceeds from the sale of these bonds will be used to pay for the line which this company proposes to build from Raleigh, through Middlesex, Wilson and Greenville to Washington, N. C., 110 miles. J. N. Turner, Raleigh, N. C., is President.

South Pennsylvania.—The foreclosure sale of the property of this company is advertised for May 14, at Geiger, Pa. The foreclosure proceedings are the result of a suit brought against the company by the Union Trust Company, of New York, for payment of the mortgage of January, 1885. Vice-President Rea of the Pennsylvania is quoted as saying that the sale relates to the western part of the line in which the Pennsylvania Railroad is in no way interested. The Pennsylvania now has no direct interest in the South Pennsylvania, though the eastern portion of its line (unfinished) is controlled by the Cumberland Valley. (April 1, p. 264.)

Terre Haute & Logansport.—The report of this company for the year ending December 31, 1903, shows an increase in gross earnings of $167,192 and an increase in operating expenses of $126,883, leaving an increase in net of $40,310. After payment of fixed charges, there is a deficit in surplus for the year of $6,089. The sum of $138,039 was expended for improvements during 1903. Of the increase in gross earnings, $136,811 was in freight earnings. Expenditures for maintenance of way show a slight increase and those for maintenance of equipment and conducting transportation larger increases.

Wabash.—This company has sold $6,160,000 5 per cent. three-year notes to Vermilye & Co. and George P. Butler & Bro., of New York. These notes are secured by all of the stock and $6,600,000 of the first mortgage bonds of the Wabash-Pittsburg Terminal Ry. Co. The latter company is to be organized shortly and the first mortgage bonds will be delivered on or before July 1, 1904. It will be used as a holding company for the Wheeling & Lake Erie, Little Kanawha and the Pittsburg, Carnegie & Western. The name Wabash-Pittsburg Terminal Co. may be changed later.